708-16

STANDARDS COMMISSION.

# GENERAL INDEX

TO

THE REPORTS

OF

# THE STANDARDS COMMISSION,

(REPORTS I. TO V.)

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

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Stamper of weights and measures for the corporation of city of London; appointed in March 1861 by the City Lands Committee. Had no previous knowledge of the duties, which include the custody of the standards and comparing weights and measures. No instructions were given as to the duties, only the Acts of Parliament. Is paid by salary (130*l.* a year). There are two sets of local standards and one set of troy weights; no decimal bullion weights; a set of liquid measures, and a set of dry measures. These standards are reverified once a year. No delay takes place in stamping during reverification, there being two sets of standards, q. 1817–1843.
Books kept. Mode of testing and stamping new weights and measures. Witness sometimes adjusts weights and measures. Process of comparison of weights. Never stamps a brass weight unless it has been examined at Founders' Hall, but the test is just as strict after the Founders' stamp, because sometimes there is a flaw. Counterpoise is used in weighing for accuracy. About 1 per cent. of the weights and measures sent for comparison are rejected. No weights other than those made of iron, brass, or gun metal are stamped. Porcelain weights are never stamped in the city of London. Measures made of pewter, copper, and tin are stamped. Iron measures are stamped for use in Billingsgate for small shell-fish, but iron corn measures are not stamped in the city, although they are in Middlesex; the Act says they shall be of wood and iron, 1844–1868.
Weights and measures used in the city of London must bear the city stamp. Stamping officer has nothing to do with inspectors; they attend to out-door duties. Reference to Act of 5 & 6 Will. 4. c. 63, directing stamping being done by inspector. Weights and measures other than of official denominations are not stamped. Troy weights seldom sent for comparison; should be under same regulations as avoirdupois weights. Introduction of metric weight concurrently with avoirdupois and troy would cause great confusion at setting off, but would soon come into working. Many yard measures are stamped, made generally of lancewood, but now of beech, as lancewood cannot be obtained. No reason why measures of subdivisions of the yard should not be stamped. Such measures as two-foot rules divided into inches should be compared and stamped. General official instructions should be issued so that there would be no difference in the systems of stamping, 1869–1916.
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Should be made cognizant of what is going on by every local inspector in the kingdom; *Mellor*, III. q. 2377.
Should issue instructions as to inspection of weights and measures to the constabulary through the Home Office; *Harris*, III. q. 2601, 2602.
Should appoint inspectors of weights and measures; *Harvey*, III. q. 3134–3136.
Should issue specific regulations to inspectors of weights and measures so as to ensure uniformity of practice; *Harvey*, III. q. 3137, 3138.
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Weights used by, should be kept strictly accurate; *Mellor*, III. q. 2708.

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Troy weights are used exclusively in the purchase of precious metals. Never uses the decimal subdivisions adopted by the Bank of England. In the purchase of gold and silver the weighing is extremely minute. Mode of testing accuracy. Troy ounce weights are officially inspected and stamped, though it is not necessarily obligatory. Standards of the decimal bullion weights are kept at Birmingham. The work in the gold and silver trade is principally done at the workmen's homes. The gold and silver are weighed out to the men and the articles again weighed when returned. For this purpose the troy ounce is sufficiently convenient and well understood by the men. Troy weight is not used to any great extent by shopkeepers, the practice being to sell at so much per article, except in silver tea sets, &c., when it is usual for the customer to buy by weight. Authorities

CARTER, MR. HENRY, JUN.—*cont.*
have not power to examine troy weights. No advantage would be gained by introducing any other system. The general public know no difference between the troy and avoirdupois ounce, but persons in business know it well enough. Series of troy weights used. The troy pound is practically 12 ounces, but it is not recognized in business. An alteration would entail an immense amount of inconvenience, would cause serious errors as regards the alloying of metals, and would upset the system of assay. Majority of Birmingham manufacturers cannot write their own names. For assay purposes the goods are sent to London, and when required are Hall marked, 3159–3218, 3220–3227.

If troy weight were compulsorily abolished the series of decimal grain weights recommended by the Commissioners would be serviceable; no new system will be adopted unless the old ounce, pennyweights, and grains were made illegal. Silver cruet stands and articles of that sort are sometimes strengthened by copper or brass, but it is not commonly done. If a change were made in the weights a decimal subdivision of the avoirdupois ounce would be the one most readily adopted by the trade. Workmen would not easily fall into any change as they so perfectly understand the system of pennyweights and grains. The 1000th part of the avoirdupois ounce would be something less than half a grain; this subdivision would be low enough. In the binary subdivision the lowest weight would be very nearly equal to two of the present troy grains; this would be low enough for inferior kinds of gold, but not for the better qualities. One-half of the 16th of the avoirdupois dram would be low enough. The decimal system is preferable to the binary, as it is so much easier for calculation and for manipulation by weighing. The decigram, equal to about a grain and a half, would hardly be low enough. If the decimal scale were engrafted into the avoirdupois weight it would be better to take it from the avoirdupois ounce. Metric system is not used by bullion dealers in Birmingham. Assay may be expressed in what is called the party assay, or decimally in proportion to the standard, 3219, 3228–3248.

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Balances and weights used by, scarcely ever correct; *Fowler*, III. 905, 906.
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Not used by inspectors in England; used in France; *Fowler*, III. q. 825, 826.
System of testing by, should be introduced; *Fowler*, III. q. 827–830.

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Is used in Manchester and Liverpool; *Mellor*, III. q. 2161–2163, 2169.
Should be compulsorily adopted; *Mellor*, III. q. 2162.

COUNTY CESS. *See* STANDARDS (IRELAND).

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COUNTY INSPECTORS:
Of weights and measures should be abolished; *Roberts*, III. q. 2731.

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COURTS, LEET:
Recommendations of Commission as to abolishing authority of, over weights, &c.; IV. *Rep.* pp. iv, vii, xii.
Practices of, were very bad as compared with present system of inspection; *Skinner*, III. q. 651.
Weights and measures formerly regulated by persons appointed by; IV. 7.
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COURTS OF INQUEST:
Of City of London do not go out now; *Ledger*, III. q. 1294.

COVENTRY:
Deterioration of standards of; IV. 6.

CRESY, EDWARD, ESQ. (*Analysis of his Evidence*), III., pp. 123–127.
Principal assistant clerk to the Metropolitan Board of Works, q. 2825, 2826.
The authority over the inspection of gas meters in London was originally in the county magistrates, but transferred to the Metropolitan Board of Works in 1861, by 24 & 25 Vict. c. 79. At the time of the change nothing had been done; no inspectors had been appointed. Now there are three districts, each with an inspector at a salary of 200*l.* a year. Every inspector is provided with several standards of 10 and 5 cubic feet respectively. The inspectors perform the work of examination themselves, being provided with assistants for carrying the meters. All their time is occupied in inspection, with a trifling exception of testing petroleum. Instructions given to inspectors. Summary of the number of meters tested and stamped from 1861 to 1868; fees received during the same period. Fees for examination, &c. of gas meters authorised by 22 & 23 Vict. c. 66. s. 19. Return of payments under the Sale of Gas Acts for each year from 1861 to 1868–9 inclusive, 2827–2854.
On an average about 10 per cent. of the meters brought for testing are rejected; no notable variation in the average between wet and dry meters. The system has worked well, although at first there was some opposition to the Board's action; the meters have been improved partly by the test and partly by mechanical improvements that have taken place. Under the Act there is an allowance of 2 per cent. in favour of the seller of gas and 3 per cent. in favour of the buyer; these allowances have worked very well, but 1 and 2 per cent. respectively would be sufficient. The Act is in force in very few places; parts of the counties of Middlesex and Surrey beyond the district have the meters tested at the Board's office. Many meters are tested in London and sent into the country. Places like Manchester and Birmingham manufacture meters extensively. In London the inspection of meters is compulsory. It is not so throughout the kingdom from some legal distinction between the enacting powers of the Acts of 1859 and 1860. Glasgow, Edinburgh, Manchester, and Gloucestershire have adopted the general Act, 2855–2873, 2912–2918.
There is no difficulty in uniting the inspection of gas meters and the inspection of weights and measures; inspectors of weights and measures might soon be taught the duty. Great inconvenience arises from the inspection of gas meters being under one body, and that of weights and measures under several local bodies; both should be under the Metropolitan Board. Police officers are especially adapted to the duties of inspectors of weights and measures, and would be useful in bringing gas measures to the office for testing and in apprehending offenders. No penalty has been imposed through the medium of the inspectors of gas meters; only a few cases of fraud in the use of meters have been detected. The provision that all meters shall be stamped after the 13th October 1871 will not throw much additional labour on the inspectors, as many gas companies have anticipated its operation. Metropolitan Board district not co-extensive with that of the Metropolitan Police, 2874–2898, 2922–2928.
It is desirable that the Standards Department should have the power to verify standards of larger capacity than 10 cubic feet. The capacity most convenient for the public would be a holder of 50 cubic feet. Reverification of gas-measuring standards is not compulsory, but the necessity for such a legal provision is obvious. It might be desirable to require reverification once in 10 or 15 years, 2899–2905.
If the inspection of weights and measures were transferred to the Board power should be given for acquiring sites and providing apparatus, similar to those now possessed under the Sale of Gas Act, 2907–2911.
Testing of gas and testing of meters in entirely different hands. Rules for determining purity of gas are laid down by the gas referees appointed by the Home Office; gas examiner is appointed by the Metropolitan Board in their district, and by the corporation in the city of London, 2919–2921. Difficulty in obtaining standard candles, 2929, 2930.
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On police as inspectors of weights, &c.; IV. 402.
On transference to Board of Works of authority over verifiers, &c.; IV. 407.
Letter from, on the subject of authorising the use of a standard meter for gas testing purposes; V. 137.

CROFT, BULLERFIELD, & CO., MESSRS.:
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CROMARTYSHIRE:
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CROOKES, MR.:
Standard light invented by; *Cresy*, III. q. 2930.

CROSLEY, MR.:
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On inefficient working of Sale of Gas Acts; IV. 307.
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Of colonies, statement of, respecting inaccuracy of certain five-gallon measures; IV. 269.

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Number to be coined in the pound weight troy of standard silver; III. 149.

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CUBIC MEASURES:
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CUSTOM OF GOLD AND SILVER TRADE. *See* GOLD AND SILVER TRADE. MILLIÈME SYSTEM. TURN OF THE SCALE.

CUSTOMS:
Recommendations of Commission respecting weights, &c. used in Customs Department; IV. *Rep.* pp. viii, xx.
In England the officers always weigh gold and silver goods; *Garrard*, III. q. 93.
Inspection of weights and measures used by; IV. 414.
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Weights, measures, &c. used by Customs Department; IV. 312–315.

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CUSTOMS (UNITED STATES):
Weights and measures for United States custom houses; IV. 326.

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On density of water; IV. 323.

DANTZIC:
Standards of commercial and money weights of, collected in 1818 by the British Government, duly verified, and deposited at the Standards Department; V. 225.

DAWS, MR. JAMES (*Analysis of his Evidence*), III., pp. 73–76.
Inspector of weights and measures for the Newington district of the county of Surrey. Was deputy inspector for two months, and assistant to inspector for 19 years. Duties. Has no instructions, only the order of the magistrates and the Acts of Parliament. Salary 250*l.* a year with part of the fines, the gross amount being about 500*l.* on the average, out of which the wages of two assistants, office rent, and other disbursements have to be paid, leaving a net remuneration of about 250*l.* per annum. The part of the fines about pay the expenses. Extent of district; it is thickly populated. No courts leet or annoyance juries in the district. The most fraudulent district in London. Authority for exercise of duties as inspector, q. 1710–1729, 1759, 1760, 1778, 1812–1816.
Local standards in his custody are a set of avoirdupois weights from 56 lbs. to ½ dram, and a set of decimal troy weights from 100 ounces to the lowest denomination; no standard metric weights. Standards are used every day and reverified every three years, the clerk of the peace giving orders for adjustment and reverification. Only partial inconvenience arises from the detention of the standards during adjustment. Number and description of balances in use. Very few troy weights are used in the district. Does not adjust weights, 1730–1757.
Has no particular system of inspection. Inspects weights, &c. in open places. Never comes across metric or weights other than those of official standards. Only occasional difficulties in carrying out duties down by the waterside. Allowance of error depends upon the trade. It would be a bad plan to allow inspectors to seize balances. Severe fines should be inflicted in cases of false balances particularly. Lever weighing machines are inspected, 1758–1774.
Balance balls not interfered with if the scales are correct, nor balances with special pans for coals. Tradesmen ought to have some means, such as a balance ball, to balance the scale with. In districts where the police inspect great neglect appears. Where inspectors are paid by salary only they appear to be less diligent, 1775–1783.
False or defective measures are produced before the court and occasionally tested there. It is difficult to detect frauds where goods are weighed beforehand; instances of fraud in case of bakers and retail coal dealers. It would be a great benefit to the public to have the weight marked on weighed-up parcels. Some of the weights seized are very deficient. Witness produces a weight purporting to represent 1 lb., which only comes to 7 oz. 6 drams. Many publicans' pots are beaten up at the bottom. The price of articles sold by short weights may be less in consequence of getting less in quantity. Instance at a baker's shop in High Street, Peckham, where a plummet of lead weighing three ounces was placed at foot of the machine. Names of fraudulent sellers should be advertised; tradesmen do not mind the fine of a few pounds, 1784–1811.
On errors to be tolerated in weights and measures; IV. 388.
On remuneration of inspectors; IV. 408.
On balance balls; IV. 412.
On fraudulent weighed-up parcels; IV. 413.
On advertising fraudulent tradesmen; IV. 414.

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Decimal equivalents of, in Imperial troy and avoirdupois denominations; II. 132, 133.
Not low enough for gold of high quality; *Carter*, III. q. 3241.

DECILITRE:
Decimal equivalents of, in Imperial denominations; II. 131.

DECIMAL ASSAY REPORT:
Is noted on the assay paper, but does not enter into calculation of values; *Forbes*, III. q. 382.

DECIMAL BULLION STANDARDS:
Number of counties, cities, and towns furnished with legal copies of official decimal bullion standards; III. *Rep.* § 5, p. iv.

DECIMAL BULLION WEIGHTS:
Not used by goldsmiths; *Stewart*, III. q. 5–8; *Garrard*, III. q. 68, 69.
Not used in Birmingham; *Heaton*, III. q. 137, 138; *Carter*, III. q. 3162.
Not used in the silver trade; *Houle*, III. q. 230; *Carter*, III. q. 3162.
No standards of, in city of London; *Blyth*, III. q. 1833.
Standards of, in Manchester; *Blyth*, III. q. 2132.
No standards of, in St. Pancras; *Gibb*, III. q. 2461.
Number of copies of standard decimal bullion weights verified; III. 146.
Have failed to meet general acceptance by the public; their abolition inevitable; III. 156.
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DECIMAL COINAGE:
Advantage of establishing a system of, in the country; would facilitate introduction of decimal weights and measures; power of Government to effect the establishment without confusion; II. *Rep.* §§ 15, 16, pp. 5, 7.
Proceedings of Standards Commission in 1841, as to the general question of decimal and international coinage; II. 121.
Introduction of, would be a stepping stone to general appreciation of the Metric System; III. 152.
Introduction of, is a question of political prudence; *Johnson*, III. q. 422.

DECIMAL EQUIVALENTS:
Tables of decimal equivalents of Imperial and Metric weights and measures; II. 130.

DECIMAL GRAIN WEIGHTS:
Will meet requirements where minute accuracy required; III. *Rep.* § 5, p. vi.
Should be constructed of distinctive form and material; III. *Rep.* § 5, p. vi.
Would be used if troy weight compulsorily abolished; *Carter*, III. q. 3219.
Verification of; V. 22.
Construction by Mr. Oertling of a supplementary set of; their description, comparison, and verification; V. 60, *et seq.*

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DECIMAL SCALE:
The real advantage of the Metric System is in its decimal scale; II. 119, 129.
Decimals have not been learned by men in gold and silver trade; *Garrard*, III. q. 72.
Decimal scale should be engrafted on the avoirdupois weight; *Carter*, III. q. 3243.
Advantages of the binary scale and duodecimal scales of division over the decimal scale; v. 13, 30.

DECIMAL SYSTEM:
Former attempts to establish a uniform decimal system of weights and measures in United States of North America; II. 113.
Decimal series of troy ounces for bullion not adopted by general public; III. *Rep.* § 5, p. iv.
No difficulty in substitution of decimal system of assay for grain and carat system as regards the Mint, Bank of England, and the bullion trade; III. *Rep.* § 5, p. v.
Useless for assay of gold and silver; does not allow a margin, which is allowed by the carat and grain; *Garrard*, III. q. 107.
Confusion would be caused if the names as well as weights were changed; *Houle*, III. q. 240, 241.
*See also* METRIC SYSTEM.

DECIMAL VALUES:
Of divisions of two micrometers of new double microscope for observing centimetres on standard scientific metre; v. 189.

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Decimal equivalents of, in Imperial, troy, and avoirdupois demonstrations; II. 132, 133.
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Inspector's share of fines in Newington, Surrey, about pay his expenses; *Daws*, III. q. 1728, 1729.
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Fines for defective weights, &c. are paid to poor rate account; *Gibb*, III. q. 2508.
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Police do not participate in fines; *Roberts*, III. q. 2752.
Participation of informers in fines is a bad plan in all cases; *Roberts*, III. q. 2800, 2801.
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FORBES, GEORGE, ESQ. (*Analysis of his Evidence*), III., pp. 12–16.
Chief cashier of the Bank of England, q. 317.
Impossible to have exact correspondence of weight and quality if metric weight be substituted for troy, because the equivalent of troy weight converted into metric weight, and of English report into millième report can only be expressed in interminable decimals, 318–321, 328. Calculations showing the relations between the two systems, and the divergence from the present system, resulting from the adoption of certain assumed bases approximating more or less to the present standards. If eight grammes were adopted as the weight of the sovereign, money calculations would be very much simplified; the sovereign could then be appreciated to one-third of a penny, 322–344.
Calculation to ascertain what millième report would bring a sovereign of eight grammes most nearly to the value of the present sovereign, 350–360.
Objection to retaining present standard of fineness. Millième report is not adopted in this country; it is adopted in France, Germany, Italy, and America. American standard is $\frac{9}{10}$ths fine, ours $\frac{11}{12}$ths; in Russia the standard is the same as the English, 345–349.
Millième report as used in France goes to the ten-thousandth part; experience shows that accuracy cannot practically be attained to that nicety. Facts in support of this opinion. Assays may be relied upon to the millième, but beyond that it is hardly safe, in consequence of difference between different assayers, 361–368, 383. A slight disadvantage in adopting the millième

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report is, that if the standard were altered the mode of calculation in a simple vulgar fraction would be lost, 400.
In the event of a change in the weight of a sovereign (a change not advocated by the witness) the new ones should be made as nearly as possible of the present weight, in which case it would not be necessary to call in the latter. The International Coinage Commission proposed to make the sovereign the exact equivalent of the 25 franc piece. The difference in value would be about 2*d.* in each sovereign, an important difference in large transactions. Inconvenience would arise from two lowest current weights; proposal of Dr. Farr to meet the difficulty by having one sovereign larger and thinner than the other. Proposed lowest current rate for sovereigns of eight grammes 915·3 fine. This would affect the Bank of England and other large establishments, but not the general public, 369–381.
Objections to distinguishing sovereigns of different weights by different dates, on the ground that it would be impossible in the transactions of the Bank of England to separate those of the one quality from those of the other by the dates. The Bank at present weighs about 20,000,000 pieces separately and singly in each year, and if each one had to be examined to see the date the labour would be trebled. For practical purposes, and as simplifying the mode of sifting the coins, the difference in diameter is the simplest mode that could be adopted. Gold coins were at one time larger than they are now; the change took place on the introduction of the sovereign, 388–399.
Decimal assay report is always noted on the assay report as a memorandum, but never enters into the calculation of the value; it is not used as between the Bank and the public. The Mint carry the assay to the $\frac{1}{5760}$th part. The rule of the trade might be altered, and the assay carried to a closer figure, 382–387. No practical inconvenience in expressing the assay to the $\frac{1}{10}$th of the millième; tables could be easily made to accommodate the one system or the other, 399, 400. Metric weight of the napoleon, 401, 402.

FOREIGN COUNTRIES, &c.
A collection of standard commercial and money weights collected in 1818, by the British Government, at the instance of Dr. Kelly, from the following countries, and duly verified, deposited in the Standards Department, viz.:—
Alicante, Amsterdam, Ancona, Antwerp, Bahia, Balearic Islands, Barcelona, Bordeaux, Boston, Bremen, Cape of Good Hope, Carthagena, Charente, Civita Vecchia, Constantinople, Corunna. Dantzic, Elsinore, France, Genoa, Gothenburg, Hamburg, Havre, Leghorn, Libau, Lisbon, Lubeck, Madeira, Madrid, Malaga, Maranham, Minorca, Nantes, New York, Nice, Oldenburg, Ostend, Paris, St. Petersburg, Philadelphia, Riga, Revel, Rio Janeiro, Rome, Rotterdam, Smyrna, Stettin, Stockholm, Trieste, Tripoli, Tunis, Valentia, Venice; v. 225.

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Different systems of calculation no inconvenience; *Garrard*, III. q. 85–87.
Orders rarely received in decimal weights; *Garrard*, III. q. 88–90.
Transactions at Birmingham in connexion with foreign trade, carried on in the Metric System; *Heaton*, III. q. 161.
Foreign tradein silver goods would not be inconvenienced by introduction of Metric System; *Houle*, III. q. 274–279.

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A measure for meal in Scotland; IV. 252.

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FOUNDERS' COMPANY:
Recommendation of Commission respecting reverification of brass weights by; IV. *Rep.* pp. iv, xxv.
Claim right to stamp and legalize all troy weights when made of brass; III. 146.
All brass troy weights are stamped at Founders' Hall; *Skinner*, III. q. 504.
Stamp of, for troy weights not in much use; *Fowler*, III. q. 918.
Founders' Company require all brass weights to be stamped by them, but have no power to put that law into force; charter of, as to stamping was granted by James II.; *Fowler*, III. q. 930, 931, 939.
According to the charter all weights stamped by, are legal throughout the country; this is disputed in some counties; *Fowler*, III. q. 931.
Right of, as to stamping weights has not been confirmed by judicial decision; *Fowler*, III. q. 934, 935.
Original design in conferring right of stamping weights by Founders and Goldsmiths' Companies; the only companies who retain right of stamping and charging fees; *Fowler*, III. q. 936.
Taking away the right of stamping from Founders' Company would be no advantage, except as a saving of expense; *Fowler*, III. q. 937.
All brass weights stamped at Guildhall must be first stamped by; *Short*, III. q. 1072.
Claim the right of stamping all brass weights; this right is recognised in the city of London; *Ledger*, III. q. 1159–1162.
Special reservation to, of rights relating to weights and measures; IV. 8.
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Privileges of, in respect to weights and measures; public inconvenience from the same; IV. 387.
Suggested compensation to, if their ancient rights of verifying brass weights be abolished; IV. 388, 394, 432.

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Number to be coined in the lb. weight troy of standard silver; III. 149.

FOWLER, MR. WILLIAM CAVE (*Analysis of his Evidence*), III., pp. 29–44.
Partner in a firm having large dealings in balances and weighing machines, III. q. 701–703.
Cost of set of balances as furnished to the inspectors. Periods at which returned for adjustment. Cost of adjustment depends upon their want of repair. The balances are mostly made to turn to a grain in 56 lbs. Those supplied to inspectors are generally very good; they are constructed upon the old principle of the balance (*i.e.*, one centre and one fulcrum), upon which it hardly seems possible to improve. Balances with agate planes are not supplied to inspectors; they are scientific instruments, and unfit for inspection purposes, 705–722.
Commercial balances are of various descriptions, the main points of difference being in their adaptation to particular trades. Many instances have occurred of tradesmen being convicted through having cheap balances of faulty construction, 723–726.
Balance or adjusting balls never could have been tampered with; they are intended to prevent fraud. The decision of the Court of Queen's Bench concerning them must have been arrived at on erroneous information. The evidence was got up as an ex-parte statement. Balance balls are for the protection of the public, and almost all persons acquainted with the trade will give the same testimony, 727, 728, 730. No means of adjustment without a balance ball, 735.

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Tradesmen's balances are subject to variation through changes in the humidity of the air. State of the atmosphere also produces changes in the goods weighed, but not so much as in the scales. The balances should be adjusted six or eight times a year; cost of adjustment. A tradesman cannot keep his balance correct without coming into conflict with the law, 730–738.
Testing and stamping balances and weighing machines would be a certificate that they were bought good, but it is not practicable here, unless we had the same system as in France, where every part of a balance is made to a gauge like a watch. Stamping the beam would be a certain guarantee, but the expense would be so great without a uniform system of construction that it could not be carried out, 739–752.
It would be very desirable to stamp and test steelyards used with special weights, if it could be done; but with our present system of construction it is impossible. There might be a scale that one pound should represent one cwt., and that weight could be stamped. In France they use the one kilogram to represent 100 kilograms, and the same system might be adopted here. The difficulty of adjusting the lever to the weight instead of the weight to the lever might be overcome, 755–774.
Proportion of error to be allowed in commercial weights and measures, 776, 777.
Inspectors in the city of London are not paid by fees; their duties are satisfactorily performed. Where the inspectors have a portion of the fees it is found most oppressive; instance, in the Tower district where in one year the fines amounted to nearly 400*l.*, half of which was given to the inspector in addition to his salary; this is an inducement to act unjustly, for which the person injured has scarcely any remedy. There are instances where inspectors have neglected their duties, but now that the general inspection of weights and measures is under the constabulary the duties are most satisfactorily performed. Inspectors should be allowed to seize balances as well as weights and measures where fraud could be clearly established, 778–803. Inspectors should not be allowed to participate in the fines; they should be paid by salary, as in the city of London, where the plan works admirably, 1007–1012.
Juries or committees for inspecting weights and measures is a ridiculous system, 804, 805. Adjustment of commercial weights and measures by inspectors; in Liverpool and Manchester it is a regular trade. Witness produces a memorial to the Mayor, &c. of Liverpool, showing the injustice of allowing inspectors to be adjusters of weights, that it is contrary to Act of Parliament, and that it interferes with the rights of the scalemakers trade. Table of fees to be taken in Liverpool for examining, comparing, and stamping weights and measures, and also for adjusting, 806–810.
Great benefit has accrued from the inspection of weights and measures by the constabulary. If a better inspector than a policeman could be got it would be well; although policemen are not educated men they are superior to others of their class, 811–813, 838, 839.
Standards Department performs its duties with great fairness and precision, 814, 815.
Present scale of error would be sufficient if only allowed in excess; no weight should be deficient in the standard, 818, 819, 832. Period for reverification should be reduced to two and a half years for weights, and five for measures, 820–822.
Commercial weights and measures should be verified by Standards Department on payment of fee, as recommended by the Commission in their First Report, 823, 824.
The French system of testing weights is more scientific than ours; it would be a good thing if it were introduced here, 825–831.
Appointment of superintending inspectors by the Board of Trade is the only way to instruct the inspectors properly, 833–835.
French system of two sets of officers for verification and stamping and for inspection would be a great improvement upon our present system, which needs improvement, 836, 840.
Local Imperial Standard measures are made of gun metal and the weights of brass. Cost of a set of weights. Sub-standards are only made for Ireland, as they are only legal there; they are generally made of black iron; galvanizing tends to increase the cost, 842–851.
Condition of local standard weights when sent for adjustment varies according to the care taken of them. As a rule they have pieces of lead or solder put on them for the purpose of making them correct. Witness

FOWLER, MR. WILLIAM CAVE—*cont.*
adopts quite a different system, viz., drilling and plugging. Inspectors should not be allowed to correct their standards in this way, as they are not likely to be correct. Greatest errors are in the weights; objections to use of galvanized iron as a coating for weights, 852–869.

Commercial avoirdupois weights mostly made of iron, a few of brass. Almost impossible to state the proportionate number of weights of each description of metal. There are but few weights under a quarter of a pound made of iron; generally speaking those under that weight are of brass. Shape of these weights, 870–880, 889, 890.

Spherical weights are only used for standards, not for commercial weights. Hexagonal weights belong to the French Metric system, but these are not used in England. Porcelain weights are always made with knobs; they are not largely used, there being objections to them. Cost of a set of weights of each description, 881–892.

Inspectors in the country adjust commercial weights, and this is a cause of great dissatisfaction in the trade. Condition of commercial weights before adjustment depends on the nature of the trade; they are always fairly used, although there are cases where they have been tampered with, where scalemakers have not been employed. Small shopkeepers manifest as much or more desire than the higher class about their weights; reason for this. Cost of adjustment. Greatest amount of error in these weights. Maximum error for wear and tear without fraud depends upon the trade in which the weights are used, where a respectable scalemaker is employed there is not much danger of the weights being incorrect, 894–913.

Intermediate weights, for which there is no necessity, are only used for dishonest purposes. The law has clearly defined a wide distinction between weights, 914.

Sale of troy weights is very small in comparison with avoirdupois weights, nor are they much used. Very few are stamped; till recently they were never stamped. Almost all troy weights are made of brass; inaccuracy and fraud in troy weights very rarely met with, 915–921, 924–927. Every weight should be stamped, 923.

French regulation requiring weights to be marked with name of maker and inspector's stamp, is a very good one; no reason why it should it not be carried out in this country, 928, 929, 960.

Founders' Company claim the right to stamp brass weights, but they have no power to enforce it; the rights are based on a royal charter of James II., and a clause in the Weights and Measures Acts reserves such rights. This right is frequently disputed, but no legal decision has been taken upon it; and there is no reason why it should not be abolished if the company received compensation, 930–938.

No demand for Metric weights except for France and Spain. French weights are made hexagonal, and those for Spain round; mostly made of cast iron and brass. If Metric weights were legalized in this country it would be a good rule to make them hexagonal. Metric system should be introduced in its entirety. No necessity to distinguish such measures as the litre, as the difference between English and French measures is so clear. It is important to prevent fraud that every wooden measure should have its capacity marked on it, 940–959, 961.

It would be impossible to convert Imperial weights to Metric; it would be cheaper to make new ones. To make cup weights hexagonal would increase the cost enormously. Paint preserves weights from corrosion, 940–959, 961–968.

Local standards of length generally made of gun metal; their cost. Generally correct when sent for adjustment. Marking subdivisions of the standard yard, foot, and inch on the present standards would be a great benefit, 969–979.

Commercial measures of length are made of lance or box wood, and the yards are generally found correct. The difference in the length of the mètre and yard a sufficient distinction, 982–989.

Sub-standards are not verified by the Department. Measures of capacity for dry goods are made of wood, those for liquids are generally of copper. Cost of set of standards and of sub-standards, 992–1000.

Cost of commercial measures of capacity, 1001, 1002. French regulation as to Metric measures of capacity should be introduced here, if the system were compulsory. Cost of Metric measures about the same as English, 1004–1006.

On the separation of verification and inspection; IV. 401.

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On official instructions of inspectors, &c.; IV. 409.
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This regulating syphon for liquid measures authorised in France; II. 83.

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French nomenclature of the Metric System should be introduced into this country; II. *Rep.* § 16, p. 6.
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Officers of the Consulting Committee of Arts and Manufactures of the Department des Archives, and of the Conservatoire des Arts et Métiers, in France, for regulating weights and measures; II. 86.
Recapitulation of points relating to the establishment of the Metric System in France; to Metric Standards; to the regulation of Metric weights and measures; to the service of verification; to the construction and verification of Metric weights and measures; to the inspection of such weights and measures, and of dealings with them; and to penalties for offences connected with them; II. 90–92.
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Shuckburgh and Kater's determination of the weight of a cubic inch of water now accepted in France; II. 128.
Gold and silver in, have a fixed price, with fluctuation premium; III. 148 (*note*).
No inconvenience caused through difference in system of calculation used in France; *Garrard*, III. q. 85, 86.
Gold and silver articles for France are entered as troy, and transferred into decimals by French customs house; *Garrard*, III. q. 92, 93.
Large bullion transactions between this country and France; *Heaton*, III. q. 170.
Millième system always used by assayers from France; *Heaton*, III. q. 201.
French measures beautifully related with the weights; *Heaton*, III. q. 207.
French standard nine tenths fine; *Forbes*, III. q. 337.
Limits in France of fineness in gold and silver; *Johnson*, III. q. 408.
Vérificateurs in; *Skinner*, III. q. 661.
Police officers in France perform duties of inspection as to weights &c.; *Skinner*, III. q. 662.
Every part of a balance in France is made to a gauge, like a watch; *Fowler*, III. q. 739.
More scientific system of weighing in France than here; *Fowler*, III. q. 826.

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FRENCH STANDARD:
Nine-tenths fine; *Forbes*, III. q. 337.
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FRENCH WEIGHTS AND MEASURES. *See* FRANCE. METRIC STANDARDS. METRIC SYSTEM. METRIC WEIGHT.

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Sold by weight in Manchester; *Mellor*, III. q. 2261.

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GALVANIZED IRON:
Not adapted for weights; will take salt and acids, and becomes corroded; *Skinner*, III. q. 453.
Galvanizing tends to make iron weights decay; *Fowler*, III. q. 869.
Use of galvanized iron for weights objectionable; *Short*, III. q. 1019, 2020.
Galvanized iron weights going out of use in Manchester; coating does not answer the purpose intended; *Mellor*, III. q. 2661, 2662.
Galvanizing makes metal softer; *Mellor*, III. q. 2663.
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*See also* IRON WEIGHTS. SUB-STANDARD. ZINC.

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GARRARD MR. J. M. (*Analysis of his Evidence*), III., pp. 3–5.
In business as a goldsmith. Uses troy weight exclusively. Decimal bullion weights not used in gold and silver trade. No confusion has arisen from use of other weights than troy, q. III., 65–70. Practically there is great objection to abolition of troy weight, from the men having been educated in the system. Dealers would more readily take up the new system than the workmen, but they are a small minority, about 1 in 100. There would be no advantage in substituting any other system, as confusion would be caused among the small manufacturers, of which the trade is generally composed, but in large firms conducted by a well educated man no immediate confusion would arise. Customers know that they buy by troy and not by avoirdupois weight; change in system not desirable, 71–82, 84, 99, 100, 105, 106.
If a change were made the status of the workpeople must be taken into consideration, also the necessary alterations in the several Acts of Parliament, 83. Has not found any inconvenience in the foreign trade through the different systems of calculation. Foreign customers give their orders for articles, the weight of which is stated in decimals or troy weight. For French Customs purposes the weight must be entered decimally, but private persons seldom require this to be done. In England the Customs officers always weigh for import purposes, 85–93.

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Metric system involves a greater number of figures than the present system, 96, 97, 124, 125. Its introduction would be of no advantage to the trade, 101–104.

With regard to assays, the decimal system is practically useless to the trade, because a margin has to be taken which the decimal system does not allow, but the carat and grain system does; a new system of quotation would cause confusion, the small manufacturers knowing the one but not the other; it would not affect the profits, but the masters would have to look after details now done by the employés, 107–110.

With regardto duty on plate, there is no unit equivalent in the Metric System so expressive as the ounce; the gramme is not an equivalent for it. The only objection to the gramme as the unit is that it would be necessary for somebody to look after the interests of the trade in the necessary alterations of the Acts of Parliament, 111–119.

Has never been visited by an authorised inspector of weights and measures; no objection to inspection; it would be a better guarantee to the public, 120–123.

The practical objection to the abolition of troy weight is the introduction of a third weight; the difficulty would be experienced by all dealers in small wares. The inconvenience to the gold and silver trade would be very great, because it will take a lifetime to instruct the men—they have learned certain tables, and as long as they live they will never learn anything else; illustration of the objection, 124–135.

GAS, GAS-MEASURING STANDARDS, GAS METERS:

Recommendations of Commission respecting inspection of gas meters, &c.; IV. *Rep.* pp. iv, vii, ix, xxii, xxv.

Further provision of gas-measuring standards required; v. *Rep.* § 8, p. v.

Reverification of gas standards with satisfactory result; new standard test gas meters in course of construction; v. *Rep.* § 21, p. viii.

Inspectors of weights and measures should not compare and stamp gas meters; *Morrison*, III. q. 1473.

Comparison and stamping of gas meters by inspectors of weights and measures would cause neglect of other duties; it might be done in country districts, but not in London; *Strugnell*, III. q. 2092–2094; *Mellor*, III. q. 2372.

Inspection of gas meters might be done by inspectors of weights and measures; *Harris*, III. q. 2595.

Inspection, &c. of gas meters in the metropolis under the Metropolitan Board of Works, number of districts, inspectors, their salaries; *Harris*, III. q. 2593. *Cresy*, III. q. 2826–2835.

Each inspector in the metropolis has several standards, and performs his own work entirely; capacity of standards; *Cresy*, III. q. 2836, 2839, 2841, 2842.

Dry and wet meters both inspected; *Cresy*, III. q. 2843.

Inspectors have no written instructions; *Cresy*, III. q. 2845.

Summary of meters received for testing and stamping from 1861 to 1868 inclusive; *Cresy*, III. q. 2845*a*–2847.

Gas-measuring standards are used for verification of meters; *Cresy*, III. q. 2848.

Fees received for verification from 1861 to 1868; *Cresy*, III. q. 2849, 2850.

Fees for testing, vary with size of meter; *Cresy*, III. q. 2851.

Expenses of Metropolitan Board of Works under Sale of Gas Acts; *Cresy*, III. q. 2852–2854.

About 10 per cent. of meters brought for testing are rejected; *Cresy*, III. q. 2855–2857.

Place on meters for stamp is provided by a provision in the Act; *Cresy*, III. q. 2858.

System of inspection has worked well, and meters have improved in consequence; *Cresy*, III. q. 2859, 2861.

Theoretical difficulty with regard to wet meters; no practical difficulty; *Cresy*, III. q. 2860.

Allowances have worked very well; are greater than required; *Cresy*, III. q. 2862, 2863, 2914–2918.

Meters tested in metropolitan district are principally used in the metropolis; *Cresy*, III. q. 2868, 2869.

Inspection is compulsory in London, but not throughout the country; *Cresy*, III. q. 2870–2872.

No difficulty in uniting inspection of gas meters with that of weights and measures; *Cresy*, III. q. 2874–2876.

Inspection might be carried out by metropolitan police; *Cresy*, III. q. 2877.

No fines imposed in respect of faulty meters; *Cresy*, III. q. 2878–2881.

GAS, &c.—*cont.*

To carry out Sale of Gas Act inspectors must be appointed in every locality; *Cresy*, III. 2882–2884.

Cases of fraud in use of gas meters; *Cresy*, III. q. 2896–2898.

Larger standards are required, say, of 50 cubic feet; *Cresy*, III. q. 2899–2901.

Periodical reverification of standards not compulsory; provision for this obviously wanted; *Cresy*, III. q. 2903–2905.

Wet and dry meters each possess certain advantages and disadvantages; *Cresy*, III. q. 2914.

Provisions as to testing quality of gas, how administered; *Cresy*, III. q. 2919–2921, 2928.

Magistrates of Middlesex declined to undertake inspection on ground of expense; *Pownall*, III. q. 2952, 2961.

Reason for declining inspection of, by Surrey magistrates; *Tilson*, III. q. 3023–3025.

Irish constabulary do not inspect; *Harvey*, III. q. 3123.

Verification and stamping of, might be performed by verifiers of weights and measures; *Harvey*, III. q. 3146.

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Inspectors of weights and measures might undertake inspection of gas meters; IV. 392.

Inspection of gas meters in London is under authority of Corporation; IV. 406.

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GIBB, MR. THOMAS ECCLESTON (*Analysis of his Evidence*) III., pp. 101–107.
Vestry clerk of the parish of St. Pancras, Middlesex. Verification and stamping of weights and measures in this parish are carried out under a Local Act (59 Geo. 3. c. xxxix). The same is the case in Paddington and Marylebone, the chief difference being that in Marylebone the number of inspectors is limited. In Islington there are somewhat similar clauses; there the vestry appoint certain parochial officers and six inhabitants who form a leet jury, q. 2413–2419.

The stamping and inspection of weights and measures in St. Pancras are almost exclusively carried on under the Local Act; sect. 25 of the 5 & 6 Will. 4. c. 63, as to not requiring re-stamping of weights is followed, although the parish is exempt from the operation of that Act; but if weights previously stamped are presented with a request that they may be re-stamped, it is done and a fee charged. County inspector never interferes. Duties of stamping and verification form no part of the duties of inspection. Prior to the passing of Mr. Gathorne Hardy's Act, the master of the workhouse acted as stamper, but now stamping and verification is attended to by a separate officer, who performs the duties without assistance. Inspection is carried out by the leet jury without remuneration, who visit from door to door. Antiquity of this mode of inspection. The earliest statute (A.D. 1266) under which the juries acted was repealed by 5 Geo. 4. c. 74. Form of stamp used, 2420–2448, 2509, 2510.

Under section 38 of the Local Act, all balances, scales, &c. not stamped as directed may be seized and destroyed, the fee for stamping a balance being one farthing. The balances are not actually tested nor stamped; the provision is not carried out. The practice is where balances are defective to recommend the party to take them to a scalemaker. If the error is not rectified on the second visit of the leet jury the balances are seized. The present stamping officer is responsible to the vestry for safe custody of the standards. Vestry have no standard troy weights nor decimal bullion weights. Jury have never gone to a place where troy weights are used. The stamper keeps a book showing the description of weights and measures stamped and adjusted, and an account of the fees received, which is checked quarterly, a moiety of the fees being paid over to the clerk to the directors of the poor, the other moiety being retained by the stamper. Witness produces the above-mentioned book, showing in columns (*on the left-hand page*) name, address, date, avoirdupois weights from 56 lbs. to ½ dram; (*on the right-hand page*)

GIBB, MR. THOMAS ECCLESTON—*cont.*
liquid measures from 4 gallons to ½ gill, wooden measures for dry goods from a bushel to a quart, the yard, total, fees received, remarks, 2449–2464, 2471–2478.

Return of weights and measures compared and stamped in 1866, 1867, and 1868. The numbers for 1867 and 1868 are far below those for 1866, in consequence of doing away with pewter pots in public houses. The fees for stamping are those in the Local Act, except in the case of ale and milk measures, 2465–2470. Method adopted for comparison of weights, measures of capacity, and measures of length, with the standards. Number of persons appointed to act on the leet jury; most of them attend, if not, they are liable to a fine; an account of these fines is kept. Mode of selection. About one-fourth of the vestry are shopkeepers. The fines for non-attendance go to the fund for the poor. Population of St. Pancras. Approximate number of householders liable to serve as inspectors, and of shopkeepers. The inspection is performed once a month at least, sometimes twice. Produces a specimen sheet of the report made by the jury to the vestry, showing the names of the offenders, place of abode, what balance, &c. defective, whether first, second, or third offence, sums amerced, occupation, remarks. Amount of fines and costs in 1866, 1867, and 1868,—2479–2508.

The 36th section of the Local Act authorises the publication of the names, addresses, &c. of offenders in the newspapers. No official publication, however, has been made since 1867, but the particulars have been inserted by reporters, and the jury have sent accounts to the papers. No special reason why the parish should be exempt from the general Act; the vestry think a jury composed of themselves is more likely to do justice to their fellow tradesmen. Practice in Marylebone and Paddington much the same as in St. Pancras. The three parishes are unwilling to abandon the system; if they wished, they could do so under Metropolis Management Acts. Causes of ineligibility as leet jurymen. In the case of defective balances the shopkeeper is cautioned, and notice given that they must be adjusted, which is generally sufficient. No advantage would ensue from power to seize balances. If the balance were found defective for purposes of fraud a penalty would be inflicted, and the balance perhaps broken up, without being taken before a magistrate. The jury, in fact, exercise the powers of a bench of magistrates. There may be an objection against the system from the number of the jury who inspect. If the system were continued it might be advisable that the jury should have a paid officer to advise with them; the work is generally better done by a man who is paid for it than by one who is not. Some of the inhabitants look upon the office as burdensome, but many seem to like it at first. The jury occasionally inspect costermongers in the street, although they have no power to do so; sellers could resist inspection if they chose. Section 3 of the Act of 1859, (which authorises "every inspector of weights, &c. to inspect all "beams, scales, and balances, and weights and measures," of any person selling goods on any open ground, and so on), does not apply to St. Pancras—it is an Act to amend the Act of 1835, which does not apply to that parish, as section 10 provides that nothing in the Act shall extend to supersede, &c. the existing powers of any jury or ward inquest. The Act of 1859 applies so far as regards periodical comparison and reverification of the standards. Hands in a book of instructions to the inspectors. The county inspectors, probably, could legally inspect weights, &c. in the open streets of St. Pancras, 2509–2556.

GILDING:
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GILL:
Decimal equivalents of, in Metric denominations; II. 132.
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Gill called "naggin" in Ireland; IV. 177.
Quarter gill measures stamped in Ireland; question of their legality; IV. 234, 281.
Imperfect crystal gill measures are common in Scotland; these cannot be seized; IV. 277.
Gill measures used by Customs Department; IV. 315.
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Tin-plate measures with pewter rims and bottoms, and with moveable rims, submitted by, in France; II. 84.

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GLASGOW:
Has adopted Sale of Gas Act, 1859; *Cresy*, III. q. 2873.
Authority over weights and measures not to be withdrawn from; IV. 405.

GLASS, GLASSES:
Remarks by Commission on measures, &c. of glass; IV. *Rep.* p. xv.
Great system of fraud in use of glasses by publicans; *Morrison*, III. q. 1392.
Glasses might be marked in the nature of a stamp; *Morrison*, III. q. 1399.
Glass is absorbent of moisture; if made non-absorbent would be the proper material for local standards; *Roberts*, III. q. 2719.
Use of glass for local working standards in Germany; IV. 340.
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Tolerance and cylindrical glasses, for ascertaining errors of measures, in Germany; IV. 353.
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*See also* GLASS MEASURES.

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Glass weights not stamped in city of London; *Blyth*, III. q. 1863.
Glass weights not stamped in Manchester; *Mellor*, III. q. 2198.
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GLASS MEASURES:
Used by publicans not inspected in Middlesex; law requires amendment in this respect; *Morrison*, III. q. 1396.
Glass and earthenware measures of capacity should be stamped; v. *Rep.* § 16, p. vii.
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GLASS METRIC WEIGHTS:
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Construction of the quartz kilogram S with other kilograms; v. 241.
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Comes from all parts of the world; depending upon the balance of trade, with certain parts; not much received from Brazil; *Johnson*, III. q. 433, 439.

GOLD AND SILVER PLATE AND WARES:
Substitution of avoirdupois or metric equivalents for duties on; III. *Rep.* § 5, p. v.
No inconvenience would arise in substituting an equivalent metric weight for the troy ounce as regards duty on; *Stewart*, III. q. 30–34.
No inspection of weights used by dealers in gold and silver wares; *Stewart*, III. q. 41–44.
Customs' officers always weigh gold and silver wares; *Garrard*, III. q. 93.
Troy ounce now the unit of weight for gold and silver wares; *Garrard*, III. q. 102.
Substitution of metric weights for the troy ounce would not cause confusion in levying duty on gold and silver plate; *Houle*, III. q. 283–285.
Limits of fineness of gold and silver; *Johnson*, III. q. 408.
Meaning of standard price of gold; *Johnson*, III. q. 424.
Troy weight used exclusively in purchase of gold and silver in Birmingham; *Carter*, III. q. 3159.
Weighing of gold and silver very minute; *Carter*, III. q. 3163.
Gold and silver bought from public by weight; *Carter*, III. q. 3212.
Weight of gold and silver plate annually chargeable with duty; III. 147.
Gold and silver have a fixed price in France; III. 148 (*note*).
Sale of gold and silver wares by weight; III. 151; quite exceptional; III. 155.
No direct legal control over weights used by manufacturers and dealers in gold and silver wares; retail dealers in them are subject to inspection; III. 155.

*See also* ACTS OF PARLIAMENT. ASSAY.

GOLD AND SILVER SMITHS:
By Act 2 Hen. 5. st. 2. c. 4. not to gild silver worse than the alloy of English sterling; III. *Rep.* § 4, p. iii.

GOLD AND SILVER SMITHS—*cont.*
Not to take more than 46*s.* 8*d.* for a pound of troy gilt; III. *Rep.* § 4, p. iii.
Substitution of metric for troy weight would be advantageous in the gold and silver trade; no objection to it, except as a temporary inconvenience; *Stewart*, III. q. 23–25, 35–40.
Use troy weight exclusively; *Garrard*, III. q. 66.
Do not use avoirdupois nor decimal bullion weights; *Garrard*, III. q. 67–69.
Trade generally composed of small workpeople; *Garrard*, III. q. 78.
Internal arrangements of factories of gold and silver smiths do not require legislative consideration; III. 153.

*See also* WORKMEN.

GOLD AND SILVER TRADE:
Advantage in having one system of weights in; avoirdupois weight would not be applicable; *Stewart*, III. q. 45–49.
Proportion of workmen to dealers in; *Garrard*, III. q. 100.
Troy ounce now the unit of weight for; kilogram would be the most convenient substitute for; *Heaton*, III. q. 170.
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GOLD BULLION:
Price at which Bank must buy; III. 150.

GOLD COINS AND COINAGE:
Temporary alteration of weight or fineness of gold coinage inexpedient; III. 157.
Gold coins were at one time larger than now; *Forbes*, III. 392–394.
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Weights for the sovereign and its multiples; V. 77.
Scale of errors to be allowed in official comparisons of copies of standard Imperial gold coin weights; V. 214.

GOLD COIN WEIGHTS:
Construction and verification of new standard gold coin weights; V. 249.

GOLDSMITHS. *See* GOLD AND SILVER SMITHS.

GOLDSMITHS' COMPANY:
Operations of, based on troy ounce; III. 149.
Verification of secondary standards for; IV. 21.

*See also* GOLDSMITHS' HALL. MIDDLESEX.

GOLDSMITHS' HALL:
Set of troy standards at; *Skinner*, III. q. 504.
Troy weights marked by Founders' Company to be stamped at; not done now; IV. 388.

GOLDSMITHS' POUND:
Contents of; III. *Rep.* § 4, p. iii.

GOTHENBURG:
Standards of commercial and money weights of, collected in 1818 by the British Government, duly verified, and deposited in the Standards Department; V. 225.

GOVERNMENT:
Recommendation to, by Commission, in regard to laws of weights, &c.; IV. *Rep.* p. xxv.
Verification of standard weights and measures for Government departments; IV. 3.
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GOVERNMENT OF IRELAND. *See* IRELAND.

GOVERNMENTS (FOREIGN):
Verification of standards weights and measures for; IV. 3.

GOVERNOR-GENERAL OF INDIA:
Despatch of Governor-General in Council, advocating immediate reform of Indian weights, setting forth the scheme proposed to be adopted; II. 97, 98.

GRAHAM, MR. (MASTER OF THE MINT):
Death of; III. *Rep.* § 7, p. vi.

GRAIN:
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Standard measures for, in Ireland; IV. 253.

GRAIN AND CARAT SYSTEM:
No difficulty in substitution of Metric system in lieu of; III. *Rep.* § 5, p. v.
Millesimal system to be substituted for, in assays; III. *Rep.* § 5, p. v.
Preference for, *Garrard*, III. q. 108.

GRAIN MEASURER:
The peso-mesureur, an instrument for simultaneously weighing and measuring grain, authorised in France; II. 83.

GRAIN WEIGHTS:
Decimal equivalents of a grain troy in Metric denominations; II. 133.
The grain, the lowest subdivision of the ounce used for gold; *Carter*, III. q. 3181, 3200.
Grain would be useless if decimal subdivisions of avoirdupois ounce were adopted; *Carter*, III. q. 3235.
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A box of decimal grain weights deposited at Standards Office; V. 8.
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Verification of decimal grain weights; V. 22.
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Scale of errors to be allowed in official comparisons of copies of standard decimal grain weights; V. 214.
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*See also* TROY WEIGHT.

GRAM, GRAMME:
Recommendation of Commission respecting substitution of 10 gramme weight for $\frac{1}{3}$ oz.; IV. *Rep.* p. xxvi.
Bill to authorise the use of weights of the denomination of grams in post offices in the United States; II. 115.
Decimal equivalents of gram in Imperial troy and avoirdupois denominations; II. 132, 133.
Substitution of the gramme, as unit in lieu of troy ounce; *Garrard*, III. q. 117–119.
No difficulty would be caused to a worker in having to work up pieces of gold and silver into grammes instead of ounces; *Heaton*, III. q. 195–199.
Proportion of gramme of standard gold to the pound sterling; *Forbes*, III. q. 327.
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Provisions of standards and sub-standards by grand juries (Ireland); IV. 9.
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GREAT BRITAIN:
Want of force in reasons for introducing the Metric system into; II. *Rep.* § 6, p. 3.
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Convictions under Weights and Measures Acts in, with penalties and costs; IV. 380.
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Employment of county police as inspectors of weights, &c. in; their salaries, &c.; IV. 402.
*See also* ENGLAND. IRELAND. SCOTLAND. WALES.

GREECE:
The Metric System nominally adopted in Greece, but practically disregarded; II. 101.
Metric System wholly adopted in; IV. 436.

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Verification of copies of gas-measuring standards for; IV. 26.

GREENWICH HOSPITAL:
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GREGG, MR. JAS.:
On errors to be tolerated in weights and measures; IV. 388.

GREGORY, MR. (OF SWANSEA):
On balances with balance balls permanently fixed; IV. 283.

GRENADA:
Verification of Imperial standards for; IV. 20.

GRIFFIN, MESSRS.:
Glass measures of capacity being constructed by, of single measures, and of graduated measures from quart and litre down to smallest Imperial and Metric measure; V. 91.
Verification of litre glass flask furnished by; V. 197.
Construction by, of complete series of standard glass flasks of Imperial and Metric measures; V. 198.

GROCERS:
Use a particular kind of scale; *Fowler*, III. q. 725.
Weights used by, require great care in adjusting; *Fowler*, III. q. 895.

GUILDFORD. *See* SURREY.

GUN METAL:
Very durable for weights and measures; *Fowler*, III. q. 869.
Is harder and wears better than iron; *Short*, III, q. 1038.
*See also* LOCAL STANDARDS. WEIGHTS. MEASURES.

GUIANA, BRITISH:
Verification of Imperial standards for; IV. 20.

GUILDHALL:
Verification of weights and measures by stamper at; IV. *Rep.* p. iv.
Answers from inspectors of weights and measures at; IV. 268.
Avoirdupois weights marked by Founders' Company to be stamped at; IV. 388.
Coal weighing machine marked at; no standard; IV. 419.
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HADDINGTON:
Verification of copies of Imperial Standards for; IV. 18.
Standards requiring reverification in; IV. 25.
Inspectors' standards, and their verification, in; IV. 74.
Inspectors' balances, and errors detected by them, in; IV. 92.
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Stamping of weights and measures in; IV. 136.
Expenses of inspection of weights and measures in; IV. 159.
Number, salaries, &c. of inspectors of weights and measures in; IV. 173.
County police employed as inspectors of weights, &c. in; their salaries, &c.; IV. 404.

HALF CROWNS:
Number to be coined in the lb. weight troy of standard silver; III. 149.

HALF GLASS:
Use of, in Ireland; v. *Rep.* § 7, p. iv.

HALF SOVEREIGNS:
Number to be coined in 20 lbs. weight troy of standard gold; III. 149.

HALIFAX:
Right of local inspection of weights and measures claimed by; IV. 386.

HALIFAX (NOVA SCOTIA):
Verification of Imperial Standards for; IV. 20.

HALL MARK:
All goods intended for hall mark must be sent in perfect; *Carter*, III. q. 3217, 3218.

HAMBURG. *See* FOREIGN COUNTRIES, &c.

HANDY BOOK OF WEIGHTS AND MEASURES:
Contains much information; IV. 9.

HANOVERIAN SOCIETY. *See* ARCHITECTS AND ENGINEERS.

HANSE TOWNS:
Metric System partly adopted in; IV. 436.

HANTS:
Verification of copies of Imperial Standards for; IV. 13.
Standards requiring reverification in; IV. 23.
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Seizure of false weights, &c., with penalties, in; IV. 99.
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Expenses of inspection of weights and measures in; IV. 148.
Number, salaries, &c. of inspectors of weights and measures in; IV. 165.
County police employed as inspectors of weights, &c. in; their salaries, &c.; IV. 403.
*See also* POLICE.

HARRIS, CAPTAIN WILLIAM CHARLES (*Analysis of his Evidence*), III., pp. 107–112.
Assistant commissioner of metropolitan police, and formerly chief constable of Hampshire, III., q. 2557, 2558.
Police were first appointed as inspectors of weights and measures for the county of Hants in 1844, and are still appointed. Previously inspectors were appointed by the magistrates. Reasons for the change. Advantage of the change. No additional expense was incurred through employing the police, nor do they receive any special remuneration. There is not the slightest difficulty in employing the police as inspectors throughout the country, including London and all the large cities. They might be appointed like the common lodging-house inspectors, a certain number being told off for the duty, with a constable attached as an assistant. In the country the superintendent might make the inspection as he goes through his division, 2559–2580.
Small boroughs should be united with counties for appointing inspectors, 2581. Police in Hampshire when acting as inspectors did not adjust weights, 2582, 2583. Duties of inspection and of comparison, &c. were not separated in Hampshire, 2586.

HARRIS, CAPTAIN WILLIAM CHARLES—*cont.*
Police in the metropolis are under the authority of the commissioner, subject to the Home Secretary; no local authorities can interfere with them. City police are subject to the authority of the corporation. County constabulary are under the chief constable, and borough police under the municipal councils, 2587–2590.
Inspection of weights and measures in Surrey and Middlesex is under control of the justices, 2591. Inspection of gas meters and petroleum under the Metropolitan Board of Works. The whole of these duties of inspection might be undertaken by the police. Witness delivers in a return showing the number of shopkeepers within the metropolitan police district, and a paper in which the police divisions are divided into 10 districts, an officer for inspection purposes being proposed to be appointed to each. It would not do to bring the old inspectors into the police; the change must be a total change. As it would be most desirable to have uniformity of action with respect to the mode of inspection, the Board of Trade should issue instructions, through the Home Office, to the constabulary. Present inspectors might be continued in the duties of verification, whilst the duties of inspection were transferred to the police, 2593–2605.
In Hampshire periodical returns were furnished, one by the inspectors fortnightly showing the particulars of the inspection in the preceding two weeks, and another, sent in monthly to head-quarters, setting forth the denominations of the weights and measures stamped and other details. A paper put in showing the amount received and carried to the credit of the county rate for comparing and stamping weights and measures, also the amount credited to the police rate for inspection, 2606–2608.
The only difficulty in the construction of the law was as to seizure of balances. It is desirable to have the power to seize balances as well as weights, which is the case in some parishes under Local Acts. Balances mostly out of order are those used for salt provisions. There could be no objection to the appointment of itinerant visitors under some public department; in Hampshire it would be unnecessary, and also in the city of London, if the inspection were in the hands of the metropolitan police. All complaints should be made to the chief commissioner, who should exercise the power of dismissal. There would be no administrative difficulties in the way, 2609–2620, 2641–2647.
Police officers if employed as inspectors in London (where it would be an exclusive duty) should be paid by a fixed salary; in the country a small additional sum should be given beyond the police pay. The expenses should fall on the county rate, fees for stamping being carried to credit of that rate. A moiety of the fees might be paid to police superannuation fund; informers should not derive any benefit from convictions. Participation in fines gives an interest in convictions; payment by salary would not cause slackness in performance of the duty. Metropolitan police not now employed in the inspection of weights and measures, 2621–2625, 2630–2640, 2648–2652, 2656.
Inspection of gas meters, petroleum, and adulteration of food, might be placed in the hands of the police, 2626–2628.
Annoyance juries are a farce, 2652–2655.
On verification and inspection; IV. 401.
On police as inspectors of weights, &c.; IV. 402.
On reverification, &c., being placed under one authority; IV. 406.
On test examination for verifiers being unnecessary; IV. 407.
On remuneration of inspectors; IV. 408.
On official instructions of inspectors, &c.; IV. 409.

HARTLEY, MR. F. W.:
Extract from "Gas Meter Testing under the Sale of Gas Act," by; the test meter and mode of using it; V. 132.
Letter from, on the advantages of gas meters over gasholders for testing purposes; V. 140.
Short specification of a model test meter; V. 141, 142.
Letter from, on the best method of using a standard test gas meter, and the adjustment of its water line; V. 146.

HARVEY, MR. RODOLPHUS (*Analysis of his Evidence*), III., pp. 134–138.
Sub-inspector in the Royal Irish Constabulary and *ex officio* inspector of weights and measures in Belfast, having the custody of the county standards. The change in 1860, transferring the inspection of weights

HARVEY, MR. RUDOLPHUS—*cont.*
and measures to the constabulary, has worked well, and the inspectors appear to have properly performed their duties. These inspectors are not relieved of any of their ordinary constabulary duties in respect of the inspection, nor are they paid any special remuneration, except a sum of 6*d.* per night when absent from their particular stations. The number of inspectors in the county Antrim is 26, which appears large; a lesser number might answer as well; they do not undergo any special training. No man under the rank of constable is appointed as *ex officio* inspector. County standards are compared either with the standards in the Standards Department or with those of another county. The wording of the Act appears to authorise this. Witness not aware that the Board of Trade considered this view clearly illegal. The grand jury are bound to provide the standards, and the judge of assize is empowered to inquire whether they have been supplied; a similar power is given to chairman of quarter sessions. There is a want of provision in the law to fix the responsibility of reverification upon some person, q. 3063–3090, 3129, 3130.

A set of sub-standard weights has been provided in every petty sessions district in Ireland; they are of iron, which is objectionable. Directions of inspector-general as to verification of sub-standards. The law as to maintenance of the standards might be improved by sending the county standards to London once in five years. Sub-standards frequently lose in weight from oxidation, through being carried about by the inspectors; in Antrim they are examined once a year. Grand jury provide funds for reverification from the county cess. Has no standards for troy weight; it is not in general use in Ireland. Some means should be provided for inspection of troy weights in Dublin, Belfast, and other large towns. A great defect in the equipment of an inspector is the want of balances. No fees are taken for adjusting and stamping weights and measures. Not aware of the opinion of the law officers of the Crown in Ireland that the words "without fee or reward" in the 25 & 26 Vict. c. 75. s. 5. refer to personal remuneration. It is not the practice in Ireland to stamp weights of other than the official standards. Power to seize defective balances is given by section 8 of 25 & 26 Vict. No complaints have been made against the exercise of that power; it has a good effect in checking fraud. No particular attention has been paid to weighed-up packages; under the general law persons guilty of any kind of fraud can be prosecuted, 3091–3122.

Inspection of gas meters does not form part of the duties of the Irish constabulary, nor is it desirable that it should. The powers given by the 8th section of 25 & 26 Vict. c. 76, to seize scales, weights, &c. if wilful fraud committed in the use thereof, are not fully exercised, nor are those of the 14th section with regard to fraud in weighing. Inspectors in Ireland do not require special authority to enter shops, as in Great Britain. The constables should be paid for the extra duty of inspection, for which a fund might be formed from the fees chargeable for adjusting, &c. If the number of inspectors were reduced better sub-standards must be provided; the grand jury would be ready to do so. One inspector to each sub-inspector's district would be sufficient in the case of counties. The best principle that could be adopted in case of appointments is to leave all in the hands of the inspector-general, subject to the approval of the Board of Trade. Uniformity of practice in the duties of inspection most desirable. Instructions to ensure this should be issued by the Board of Trade, to which cases of doubtful construction of law, &c. might be referred. Fees for stamping weights and measures should be levied in Ireland as well as in Great Britain. Duties of comparing and stamping weights should be separated from the inspection of them. Constabulary do not adjust weights. Official supervision should be appointed by the Board of Trade. Law as to inspection of petroleum is not carried out because the authorities consider it requires more technical skill than the constabulary possess. Difficulty in getting commercial weights and measures adjusted. Mode of meeting the difficulty proposed, 3123–3154.
On verification and inspection; IV. 401.
On police as inspectors of weights, &c.; IV. 402.
On official instructions of inspectors &c.; 409.
On official supervision of standards; &c.; IV. 409.
On fraudulent using of weights, &c. in shops; IV. 413.

HASSLER, MR.:
Weight of water contained in a litre, as ascertained by Mr. Hassler in 1832; II. 29.

HASSLER, MR.—*cont.*
Reports by, on American weights and measures; IV. 321.
Comparison by, in America, of the mètre à bouts and mètre à traits with the British Imperial Standard; V. 157.

HAUPTNORMALE (PRINCIPAL STANDARD):
Form, &c. of, in Germany; IV. 341.

HAVERFORDWEST:
Number of sets of standards verified for; IV. 22.

HAVRE:
Standards of commercial and money weights of, collected in 1818 by the British Government, duly verified, and deposited in the Standards Department; V. 225.

HAWKERS:
Fraudulent weights used by; IV. 289.
Verification fees paid by, in France: IV. 411.

HAY AND STRAW:
Steelyards used in weighing of hay and straw; *Short*, III. q. 1509.
Recommendations of Commission relative to weighing of hay; IV. *Rep.* pp. ix, xx.
Duties of inspectors of weights and measures with respect to sale, adulteration, &c. of hay; IV. 416.

HAYMAN, MR.:
On impossibility of undeviating accuracy in weights and measures; IV. 31.
On want of correspondence between standards, convictions, amendment in weights and measures laws, &c.; IV. 258–263, 292.
Cases by, illustrative of working of Weights and Measures Acts; IV. 258–263, 292.
On allowance of error in weights, &c.; IV. 410.

HEADCORN:
Mutual Trade Protection Society at, on working of weights and measures system, &c.; IV. 271, 281.
*See also* BEARSTEAD.

HEAPED MEASURES. *See* MEASURES.

HEATON, MR. RALPH. (*Analysis of his Evidence*), III., pp. 6–10.
Carries on the business of metal manufacturer at Birmingham, III., q. 136. Uses troy weights rarely, avoirdupois largely, metric weights extensively for foreign trade, but not decimal bullion weights. Metric weights not used largely in Birmingham, decimal bullion weights not at all, 137, 138, 147, 148.
Concurrent use of avoirdupois and troy weight inconvenient, but no inconvenience caused to customers. In the electro-plate trade the article to be plated is bought by avoirdupois, and when plated weighed by troy weight: this has not led to mistakes on the part of buyers, but certainly causes confusion, 139–142.
Feeling of the Birmingham trade is in favour of abolishing troy weight. If the change were compulsory the inconvenience would be very slight. Abolition would not cause inconvenience to customers, 143–146, 149–152. If the abolition were permissive, it would lead to confusion, but if persons were compelled to adopt the change they would in a short time find it to their advantage, 166, 167, 190–199.
If abolition were made compulsory, 12 months would be ample as the limit at which troy weight should be made illegal. In Italy 18 months was allowed for the change to the Metric System. Complaints were made, but when the change was effected the people were unanimous in approving of it, 153–157, 213–215.
The Metric System is so simple that the workmen get into it at once,—and is more likely to be correct; no possibility of mistake from either wrong divisor or wrong division, 158, 159, 225. The simplicity of the Metric System cannot be fully appreciated until the weights, measures, and moneys are all included in it, 205–211. The change in weights and money in Italy was simultaneous, 212–215.
Contracts with foreign governments in which witness's firm is engaged are nearly all on the Metric System. The accounts are kept in avoirdupois up to the point of delivery; it is then in Metric weight. In the home trade the old system is adopted, because people will not take the trouble to understand the other till they are compelled. To effect a change, whichever system may be adopted, it would be necessary to make all contracts founded upon any other system illegal, 160–165. If troy weight were abolished, the Metric System should

HEATON, MR. RALPH—*cont.*
certainly be substituted, 168, 169. Some members of the trade where avoirdupois weights are used do not see the advantage of adopting any other system, 181, 182.
The kilogram will be the most convenient unit of weight in place of the troy ounce. There would be no inconvenience in rearranging the scales of duty if tables were issued showing the relative values of the old and new weights; whatever change may be made there would be some slight inconvenience until the thing is understood, 170–180, 189–199.
Metric System would be more simple for quotation of assays, and in a year or two any inconvenience caused by the change would cease. The more simple any form adopted is, the better and more just it must be both for buyer and seller. As there would be no alteration in the rate of charge, the profit would remain the same, 183–188.
An assay on the Metric System, being expressed decimally, is very simple. There would be more utility in adopting the same system for moneys also. Fineness of bronze and such like metals is expressed by what is called the millième system, as in France and Italy, 200, 201.
Troy weights are not inspected; inspectors say they have no authority to try them. There is no reason why these weights should not be inspected, 202–204.
Avoirdupois weight not more convenient than troy weight, 216–218. There should only be one weight, and that the best; to have both metric and avoirdupois would create confusion, 220–222.
There is no difficulty in getting accurate Metric weights in Birmingham. As only common metals are used the weights do not go lower than the tenth of a gramme. No one who understood the Metric system but was delighted with it; great benefit would arise from its adoption, 225–227.

HECTARE:
Decimal equivalents of, in Imperial denominations; II. 131.

HECTOGRAM:
Decimal equivalents of, in Imperial troy and avoirdupois denominations; II. 132, 133.

HECTOLITRE:
Decimal equivalents of, in Imperial denominations; II. 131.

HECTOMETRE:
Decimal equivalents of, in Imperial denominations; II. 130.

HEKTAR:
The hektar of the North German Confederation, its equivalent in Metric measurement; II. 110.

HEKTOLITER. *See* FASS.

HENNELL & SONS, MESSRS.:
Reply from, to questions as to abolition of troy weight, substitution of Metric weights, and inspection of troy weights; III. 151.

HEREFORDSHIRE:
Verification of copies of Imperial Standards for; IV. 13.
Standards requiring reverification in; IV. 23.
Inspectors' standards, and their verification. in; IV. 46.
Inspectors' balances, and errors detected by them, in; IV. 84.
Seizure of false weights, &c., with penalties, in; IV. 100.
Stamping of weights and measures in; IV. 118.
Expenses of inspection of weights and measures in; IV. 148.
Number, salaries, &c. of inspectors of weights and measures in; IV. 165, 379.
Population; salaries of inspectors of weights and measures, &c. in; IV. 379.
County police employed as inspectors of weights, &c. in; their salaries, &c.; IV. 403.

HERTFORDSHIRE:
Verification of copies of Imperial Standards for; IV. 13.
Standards requiring reverification in; IV. 23.
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Inspectors' balances, and errors detected by them, in; IV. 84.
Ssizure of false weights, &c., with penalties, in; IV. 100.
Stamping of weights and measures in; IV. 120.
Expenses of inspection of weights and measures in; IV. 148.

HERTFORDSHIRE—*cont.*
Number, salaries, &c. of inspectors of weights and measures in; IV. 165.
County police employed as inspectors of weights, &c. in; their salaries, &c.; IV. 403.

HESSE:
Measures of length, capacity, and weight in; II. 100.

HESTON. *See under* MIDDLESEX.

HEXAGONAL WEIGHTS:
Only belong to French Metric System; *Fowler*, III. q. 882, 883.
Hexagonal avoirdupois weights never made in England; *Skinner*, III. q. 472.

HISTORICAL STANDARDS:
Transfer of, to the Standards Office; I. *Rep.* § 12, p. 7.
Damage received by some at the Paris Exhibition; I. *Rep.* § 13, p. 7.
*See further* STANDARDS.

HOLBORN DIVISION:
Convictions for short weights and measures in, omitted from House of Commons return; *Pownall*, III. q. 2975, 2976.

HOLLAND:
Imperfect adoption of the Metric System in; II. *Rep.* § 7, p. 4.
Introduction of the Metric System into Holland; the system in force for all things except weighing medicines; II. 101.

HOME OFFICE:
Gas referees appointed by; *Cresy*, III. q. 2921.

HOME TRADE:
Great preponderance of, over foreign trade; II. *Rep.* § 14, p. 5.
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4. *In Surrey.*

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JOHNSON, ANDREW, ESQ. (*Analysis of his Evidence*), III., pp. 16–19.
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There is no absolute Metric equivalent for the present expression. Where the Metric System is in use the limits of fineness are carried much further than in England. In weighing bar gold the French weigh to the tenth of a gramme, in England we weigh to the twelfth of a grain. If the substitution of Metric weight for Troy were made compulsory it would be necessary to alter the conditions under which the Bank of England is at present placed. The present practice of weighing is customary. To all persons engaged in large transactions it is of little consequence by what system calculations are made, as they are sufficiently educated to meet any difficulties, but it is not so with people generally. In 1853 the Bank abolished the system of weighing in lbs., ounces, &c., and substituted weighing in ounces and decimals of ounces—a more scientific and better method, but no one in the trade has adopted the system, except in his relations with the Bank, 404–411.
Troy weight cannot be got rid of without a new definition for the pound sterling. The decimal division of the Metric System is the only good thing about it; there is no excellence in the metre as compared with the inch, 412, 419, 422.
Trade profits would not be much affected by a new system of computation; the matter would adjust itself. The object to be attained in a change from the English to the Metric System is not the attainment of the unit, but of dividing the unit, whatever it may be, and unless completely and universally obligatory it is not worth while to make the effort, 413–418.
By making the new sovereign a little heavier and a little coarser it would be brought very nearly to the value of the existing sovereign. The lowest current weight of the new sovereign must be greater than that of the present one, 420, 421.
The question is not one of arithmetic, but of political prudence. While the change is taking place the interest of the million is sacrificed to the millionaire. It is a cosmopolitan system, and the interests of the domestic trader are sacrificed to the interests of the foreign trader, 422, 427, 428.
French millième reports profess to report to the $\frac{1}{10000}$th part. It is not humanly possible to do it, there is so great a difference between assayers. It is barely possible to assay closer than $\frac{2}{10}$ths of a millième. The trade only go as far as $\frac{1}{768}$th part, or the $\frac{1}{8}$th of a carat grain, but the Mint assay to the $\frac{1}{5760}$th part, the last grain in the pound troy, 423.
If a change were introduced a new parliamentary price must be established. Parliamentary price of gold is only an equivalent denomination. 3*l.* 17*s.* 10½*d.* is not the price of an ounce of gold, but it is the number of gold coins that can be made out of an ounce of gold. This simple fact has not been generally observed. One of the greatest advantages of a change from the present system would be that we might make our unit of value coincident with the unit of weight. The whole question is an educational thing, and we are far from having learnt our lesson, 424–427.
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LEDGER, MR. EDWARD. (*Analysis of his Evidence*), III., pp. 48–56.
Inspector of weights and measures for west district of city of London; appointed by the justices of the city, III. q., 1095–1099, 1125, 1132.
Duties include custody of standards used by inspectors, but not of standards by which weights are tested. No special or written instructions were received by witness on appointment, but he obtained the Acts of Parliament relating to his duties. There is an assistant for moving the standards about, who gives his services to each of the inspectors in turn. The inspectors in the city are paid by salary only, 1100–1114, 1215.
False and defective weights are broken up and sold as old metal, and the proceeds paid into the chamber of London, 1115, 1116.

LEDGER, MR. EDWARD—*cont.*

Description of the local standards in custody of inspectors. The inspectors give a bond for the safe custody of these standards; they are not used by the stamper (who is appointed by the Corporation). Local standards are reverified every three years, generally during the inspectors' annual vacation; no public inconvenience ensues, as the standards are used for inspection only, 1117–1137.

Balances used by inspectors are adjusted generally once a year. Books kept. The fines are handed into the chamber from the police office. A weekly report is made, and handed in to the Committee of Aldermen; another report, relating to licensed victuallers only, is sent in annually. A general report with reference to cautions, convictions, &c., in a great number of trades also made every year, 1138–1146.

Inspectors should not be allowed to adjust weights and measures for tradesmen; it is done in the country, 1148–1150. Description of mode of comparing commercial weights with the standards, as adopted by inspectors. Inspectors make no allowance for draught or error, 1152–1155.

The law requires troy weights to be stamped as well as avoirdupois. Very little inspection goes on in troy weights. Difficulty of inspection in the city through the use of cup weights, for which there is no standard above 12 oz. Founders' Hall claim the privilege of stamping brass weights, of which weights the inspectors practically admit the validity. Legal series of troy weights, 1156–1175.

Allowance of the use of Metric weights and measures would not lead to much confusion if sales by troy weight were prohibited. Existence of troy and avoirdupois concurrently with the Metric system would not make much difference. Expediency of abolishing troy weight. Some advantage in the small sub-divisions for very small quantities of the precious metals. No great practical utility in requiring balances to be tested and stamped, unless applied to the mode of construction, 1176–1191.

Denominations of measures of capacity tested by inspectors, and method of testing. Confusion and difficulty arise from use of vessels which are not exact measures being taken for measures, especially in the sale of milk. Every measure should have its denomination stamped on it. Milk measures in the city are tested and stamped, 1192–1208.

Measures of capacity for dry goods; denominations tested; when made of wood they are subject to alteration by wet. Measures of length mostly of brass and wood, 1209–1214.

Witness visits every part of his district; the large wholesale houses about once a year; wharves, &c. twice; such shops as publicans, bakers, &c. five or six times a year, and the Metropolitan Meat Market nearly every week; extent of district; number of places visited annually, 1216–1221.

No annoyance experienced in exercise of duties, 1228, 1229.

Metric weights not much used, except in houses doing business with France. Intermediate weights are occasionally met with, 1222–1227. Practice of inspectors as to errors of weights, measures, and balances. No difficulty arises from want of authority to seize balances in shops. Inspection of large weighing machines and those with special weights; something wanted by which the weights could be tested, 1230–1240.

Balance balls, in the city of London, are required to be fixtures, or hung on a hook. The object is to enable tradesmen to adjust their scales, but they may be used for purposes of fraud. Witness never interferes with them if the balance is correct, or with other balances of peculiar construction. Does not test weights carried by coal carts; such weights are not tested unless seen used; but it is a special duty to see that such weights and scales are carried, 1241–1255.

If power were given to inspectors to detect and inform against frauds in the method of weighing, and against frauds in making up goods before hand, and selling goods in parcels of defective weight (although it would increase their duties), it would be a protection to the public. There would be no harm in advertising names of persons guilty of fraud; they generally get reported. Magistrates under Local Acts have this power of advertising, and the Court of Aldermen have given orders for such advertising, 1256–1263.

Not desirable to employ policemen as inspectors. Separation of duties of comparison and stamping weights, &c. (as in France) very desirable, and, as in the City of London, officers employed in comparison and

LEDGER, MR. EDWARD—*cont.*

verification of weights should not be engaged in any other employment. There should be an examination of inspectors to show common sense and a knowledge of weights and measures. Duties as to inspection of petroleum, 1264–1279.

General regulations, if practicable, would be useful: the Act of Parliament for verification of standards and supervision by local authorities ought to be sufficient. Plugging brass weights with lead is very objectionable. All weights should have their denomination stamped upon them, 1280–1293. Courts of inquests in city of London are now done away with, 1294.

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In St. Pancras; *Morrison*, III. q. 1424.
In St. Marylebone; *Morrison*, III. q. 1424.
In Paddington; *Morrison*, III. q. 1424.
5 & 6 W. 4. c. 63. s. 25. reserves rights of, under local Acts; *Morrison*, III. 1424, 1425.
In Duchy of Lancaster (part of the Strand); *Morrison*, III. q. 1428.
Should be abolished; *Morrison*, III. q. 1429; *Mellor*, III. q. 2382.
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None in Newington district of Surrey; *Daws*, III. q. 1778.
None in Manchester, III. *Mellor*, q. 2381.
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Number appointed in St. Pancras; *Gibb*, III. q. 2484.
Fine for non-attendance in St. Pancras; *Gibb*, III. q. 2485.
Quorum of, in St. Pancras; *Gibb*, 2486.
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Are a great farce; *Harris*, III. q. 2654, 2655.
Are simply "annoyance" juries and nothing more, they are perfectly useless; *Pownall*, III. q. 2942–2945.
Remarks of Commission on inspection of weights and measures by annoyance juries; IV. *Rep.* p. iv.
Institution of annoyance juries for regulating weights and measures; IV. 8.
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MEDICAL PROFESSION:
Change from troy to the Metric System would be easily made by; iii. 144.
Some still use the dram and scruple; iii. 156.

MEDICAL WEIGHTS AND MEASURES:
Verification of, &c., in Germany; iv. 337, 339, 341, 342.
Fees for verification of, in Germany; iv. 372.
Medical weights and measures in Ireland; iv. 253.
*See also* PHARMACEUTICAL WEIGHTS AND MEASURES.

MEDITERRANEAN:
Weights and measures of countries bordering on, have no relation with the Metric System; ii. 100.

MELBOURNE:
Verification of Imperial Standards for; iv. 21.

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Chief inspector of weights and measures for the city of Manchester, having been appointed by the magistrates in 1844. Had no previous knowledge of the duties of the office, except the general knowledge of a mechanical engineer. Special instructions were given on appointment; this is exceptional. Has two assistant inspectors, appointed and paid by the magistrates. All are paid by salary; salary of witness is 220*l.* per annum. Situation of office, arrangements for performance of duties, and business done in the office. Extent of district; population; number of shops, q. 2113–2128, 2164–2168, 2274, 2279, 2280.

Proceeds of false and defective weights and fees for stamping and adjusting are paid over to the treasurer; inspectors derive no profit from them. Description of local standards. Standards are reverified as often as required, and adjusted about every month. No public inconvenience nor cessation of inspection arise during reverification and adjustment. Number of balances in use; they are adjusted as often as required; beyond these the apparatus consists of standard weights and measures and stamps, 2129–2148.

A large number of books kept. In the "In-door Journal" the entries are made daily, and the money received added up weekly and paid over to the treasurer. This book shows in columns (*on the left-hand*) the date when weights and measures were brought to be stamped, date when returned, name, trade, residence, remarks: (*on the right-hand*) number of ticket, weights and measure stamped, weights and measures adjusted, amount received for stamping, amount received for adjusting, total. The "Out-door Journal" shows (*on the left-hand*) the date of visit, name, residence, trade, scales, number and description of weights and measures examined and found correct: (*on the right-hand*) number and description of scales, weights, and measures found defective and reported, date of conviction, convicting justices, amount of fine, costs, previous convictions, observations. Each inspector has a similar book. A report is made about every six weeks to the watch committee of each day's duty and



the amount of money received. All weights are tested by counterpoise, as at the Board of Trade; this plan should be enforced; this method is also adopted in Liverpool, 2149–2163, 2169, 2170.

No charge is made for comparison of weights previously stamped, if found correct. Weights are stamped after comparison, but balances are not. Balances should undergo inspection before being sold; it would be a guarantee that they were correct at one time, and a protection to honest tradesmen. The public of Manchester consider it an advantage that they can get their weights adjusted at the place where they are stamped. It is as legal for the corporation to adjust weights as for any person. The absence of complaint shows that in Manchester it has been an advantage. The construction of 5 & 6 Will. 4. is open to great question; there is nothing in it to prevent an inspector from adjusting weights. Production of the scale of fees charged for stamping and adjusting weights. It is desirable that power should be given to authorise inspectors to adjust weights; new weights are rarely accurate when sent for comparison, 2173–2196.

Practice as to allowance of error. No weights are stamped unless made of iron, brass, or gun metal. Earthenware weights are not allowed to be used in Manchester. Only weights and measures used as official standards are compared or stamped; others were compared and stamped at one time, but the practice was discontinued on its illegality being discovered. Troy weights are compared and stamped, and a notice was issued that this must be done, to which no objection was made. There is no reason why troy weights should not always be stamped and inspected. Introduction of the Metric System concurrently with the other weights would cause confusion. Troy weight should be abolished, and the Metric System adopted as far as regards bullion and silver, avoirdupois being allowed as now. Feeling in Manchester is against the Metric System. This system should be made compulsory, but much time would be necessary before the compulsory provision was brought into operation, 2197–2220.

All commercial balances should be stamped. In balances with platform pans, they can be made to weigh against or for the purchaser by shifting the lever. This would be obviated by stamping, as no inspector would allow them to be used. There is no power in Manchester to interfere with them except in the market and in the streets. Mode suggested for stamping the beam. Regulations for examining and stamping measures of capacity. All new measures should be of the same shape as the standards. All measures having their contents marked upon them are treated as measures; if not marked they are taken to be drinking cups. Milk measures are stamped. Dealers in measures and weights in Manchester are charged half the fee for adjustment as an inducement to sell them ready stamped. Method of stamping measures for liquids. Measures of capacity for dry goods are always made of wood; measures for grain are made with iron rims. These measures are always cylindrical. Fruit, grain, and everything of that kind should be sold by weight. It is easier to commit fraud with measures than with weights, 2221–2266.

Yard measures the only measures of length tested and stamped. It is desirable that inspectors should have power to stamp two and three foot rules divided into inches, 2267–2273. No regular system laid down for visiting witness's district; he supervises stamping and adjusting of weights and measures, and inspectors and workmen. Provision dealers require more frequent inspection than others. Hawkers of coal are compelled to carry machine and weights of a certain pattern; if not in accordance with the standard they are seized. This power is given by the Local Act; the General Act does not give it. In Manchester coal carts may be stopped and their machine and weights examined. This power should be conferred on inspectors generally. Witness meets with no difficulty or annoyance in performance of his duties. A vigilant inspection is to the advantage of the fair trader. Seizure of erroneous weights, &c. is a matter requiring great judgment; no general regulation could be made to meet every case, 2275–2278, 2281–2297.

There is great difficulty from want of power to seize false or defective balances. As a rule balances should be brought before the magistrates in the same condition as when seized. Seizure of the balance would prevent a man trading with that particular balance, but a second pair of scales is generally in use. All the larger weighing machines, including steelyards and weighbridges, are

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inspected. Hundreds of thousands of pounds worth of goods are sold by them in Manchester, and fraud is constantly practised. Mode of testing weighbridges adopted by witness, which should be used generally throughout the country, it being absolutely necessary for securing just weight. The weights generally used for these weighing machines are what are called tail weights, but some have a sliding poise, on the principle of the common steelyard. In some of the larger machines "cheese weights" are used, which are not made of any determinate weight. All these weights should possess some proportion to the standard. There would be no practical difficulty in adapting the lever to the weight instead of the weight to the lever, 2298–2325.

When balance balls were first found in use in Manchester they were condemned by witness as illegal. A case was argued before the stipendiary magistrate, who considered that the matter should be submitted to the Court of Queen's Bench. This the corporation declined to do. Since then a case has been tried by that court, and decided in favour of view taken by witness. Plan adopted to prevent balance balls being used for purposes of fraud. The balance can be corrected without the use of the balls by soldering a piece of lead on one end of the pan and removing a little, if the scale got too heavy. This method is now in use. In the hands of an honest man the balance ball is well enough, but it may be altered so quickly for purposes of fraud that the inspector would have no chance of detecting the dishonest trader, 2326–2340.

In the case of balances of peculiar construction, such as those with special pans for coals, the scoop, though moveable, is an integral part of the scale; if taken away the balance could not be used. Some power should be given with regard to the inspection of weighed-up parcels. The principle of the Bread Act should be adopted, giving the purchaser the right of compelling all articles to be weighed in his presence. It is the duty of the magistrate to distinguish between cases of wilful and negligent fraud. Where the inspector finds wilful fraud the offender is at once summoned; if the fraud arises without intention a caution is given. Cases of wilful fraud or culpable negligence should be advertised; publicity is greatly feared, 2341–2360, 2378–2380.

As a rule policemen are unfit as inspectors of weights and measures; illustration. In Lancashire police officers acting in relation to weights and measures receive 30*l.* for the extra duty. The French system of separating the duties of comparison and stamping from those of inspection is practically carried out in Manchester. No officer engaged in the duties of comparing and verifying weights and measures should be allowed to follow another occupation, and this is done in Manchester. Inspectors on appointment should be required to undergo an examination; nature of the examination. Comparison and stamping of gas meters by inspectors of weights and measures would occupy too much of their time. Inspection of petroleum should be in the hands of persons who know something of chemistry. Specific and detailed instructions to ensure uniformity of action, and due compliance with the law on the part of the inspector would be a great advantage to the public; further, some one should be appointed to visit the inspectors and see that the instructions are carried out. This would be the most useful thing that the Government and Parliament could do, as by it uniformity would be attained. The Board of Trade ought to have full cognizance of what is going on by all the local inspectors, 2361–2377.

There is no leet jury in Manchester; a leet jury is a foolish thing and ought to be abolished. Present system of inspection throughout the country generally is not satisfactory. In Manchester the inspectors were formerly appointed by the magistrates; now the corporation appoints. It is objectionable that town councils should have the power of appointing inspectors, because many of the town councillors may be shopkeepers, 2381–2400.

From 30 to 40 shops visited daily in Manchester. The decreasing per-centage of convictions is attributable to vigilant inspection, and the heavy penalties inflicted where fraud has been proved. Weights and scales as a rule are kept correct; fraudulent cases are the exception. Witness puts in a copy of "General Instructions "to the Out-door Inspectors of Weights and Measures "for the Borough of Manchester." The receipts from fines and produce of forfeited goods have progressively decreased from 1845 to 1866, whilst the expenditure has

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increased: the public have benefited in consequence of their being subjected to less fraud, 2401–2409.

(*Further examination.*)

To test cubic measurement of dry goods in the markets and open places, a rule is used supplied by the Standards Department. This is only an approximate test; but it is preferable to anything in the nature of a sliding rule, and has been used in Manchester for 20 years. Galvanized iron weights are going out of use in Manchester; they do not answer the purpose intended; otherwise there is no objection to them. As the weights must be made red hot before the zinc is applied, the iron is made softer; such is found to be the case in adjusting them. Occasionally some half hundredweights have been seen coated with oil paint for the purpose of preventing the iron from rusting on exposure to rain; a few japanned weights are sent in at times. Mode in which fraud is committed by ordinary balances, generally committed in the markets, market-places, and by hawkers. In London this is called "marrying the beam." Produces and describes a shot balance ball, also a false measure. The plan adopted in France of stamping measures of capacity on the bottom is a good one. In Manchester they are stamped on two sides opposite each other in the inside of the measure. Power to seize the balances would not assist much in the prevention of fraud; but it operates as a punishment. Issuing authoritative regulations as to balances might assist in the prevention of frauds. Produces a form of receipt, at back of which are printed directions to shopkeepers and others, showing what the law is as to scales, balances, measures, &c. It would be very desirable that the Standards Department, or some other public office, should give some general instructions to inspectors, and some one appointed to enforce them, 2657–2677.

If the Metric system were introduced concurrently with the existing system, some stringent measures must be adopted for preserving a marked difference between the two kinds of weights. If the Metric weights were made of a distinctive character and of a special kind of metal there would be no difficulty in carrying the system out. Advantage accruing from inspectors adjusting weights. The expenses of inspection and adjustment are defrayed by the corporation of Manchester. The shopkeepers pay, according to a scale, the fees for adjusting, which are paid over to the city treasurer. Hands in and explains a form which goes with the different shopkeepers' weights. There is no examination of inspectors on appointment. Explains mode of adjustment adopted. Amount of penalty in degrees of fraud must be left to the discretion of the magistrates. There do not appear to be more cases of fraud in Salford than at Manchester, 2678–2693.

Inspectors should not be allowed to alter their own standards; it is contrary to Act of Parliament. The tools of every description used by inspectors should be strictly specified. The weights and measures establishment at Manchester is very complete; endeavour has been made to make it serve the convenience of the public as far as possible. With regard to occasional and periodical inspection, witness hands in three notices to show the endeavour made to induce persons to send their weights to be examined, &c., but little response is found to ,them. Plan adopted in Bath requiring weights and measures to be sent in periodically would not be responded to in Manchester so as to make it worth while to have it done. Bribery of inspectors has been attempted in Manchester. Police officers not specially fitted as inspectors of weights and measures. No case known in which inspectors have been fined for neglect of duty or misconduct. Explanation of apparatus used for inspecting, 2694–2708.

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Cost of a set of Metric measures of capacity from the litre downwards is about the same as of a quart downwards; *Skinner*, III. q. 635.
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Metric measures of capacity should be distinguished for dry goods, by having brass bands, or could be made square; *Skinner*, III. q. 644–647.
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Introduction of Metric System in the gold and silver trade would be the first step in introducing it throughout the country; would be an advantage; *Stewart*, III. q. 53, 54.

No trouble in learning the Metric System; *Stewart*, III. q. 58.

No necessity for employing additional clerical assistance for; *Stewart*, III. q. 60.

Metric System involves greater number of figures than the present system; *Garrard*, III. q. 96, 97.

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Metric System is so simple, that workmen get into it at once; *Heaton*, III. q. 158.

Calculations in, much more likely to be correct than in the English system; *Heaton*, III. q. 159.

Great superiority of Metric System, especially in connection with measures and moneys; *Heaton*, III. q. 164, 168, 169.

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Silver trade would not not be much affected by introduction of Metric System as regards foreign trade; *Houle*, III. q. 274–279.

Decimal division of Metric System the only part worth anything; *Johnson*, III. q. 412, 419.

No supernatural excellence in, as compared with the inch; *Johnson*, III. 412, 419.

Would not affect profits of the trade, but if it brought increased closeness of weighing, certain profits would; *Johnson*, III. 413, 414.

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Concurrent use of two systems would make confusion worse confounded: how the confusion may be avoided; *Skinner*, q. 523–528.

Regulation of Metric System as to adjusting machines to weights should be introduced into this country; *Skinner*, III. q. 588, 589.

Metric System should be adopted, if any alteration made; *Skinner*, III. q. 591.

If Metric System introduced, should be introduced in its entirety; *Fowler*, III. q. 948, 949.

Multiples and subdivisions of Metric System as adopted in France answers well; *Fowler*, III. q. 961, 962.

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Will require powers to acquire sites in event of inspection of weights and measures being transferred to it; *Cresy*, III. q. 2907.
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METROPOLITAN DISTRICT A, WEST, SURREY:
Extent of, population, and number of shops in; *Strugnell* III. q. 1919–1923.
No instructions issued to inspector; he simply acts under the Acts of Parliament; *Strugnell*, III. q. 1927–1932.
Assistants to inspector paid by him; *Strugnell*, III. q. 1933, 1934.

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Inspectors paid by salary and half the fines; *Strugnell*, III. q. 1935–1936, 1959.
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Use of counterpoise by inspector; *Strugnell*, III. q. 1942.
Weights and measures not re-stamped in, if correct; *Strugnell*, III. q. 1943–1946.
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METROPOLITAN POLICE DISTRICT:
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MORRISON, MR. EDWARD (*Analysis of his Evidence*), III., pp. 56–64.

Inspector of weights and measures for No. 3 district of Middlesex, having been appointed by the justices on the 12th of April 1855. Possessed no knowledge of the duties of the office. Description of the duties. Has no instructions, only the Acts of Parliament. Is paid by salary and a moiety of the fees and fines, out of which he has to find the wages of an assistant, the rent of an office, and other expenses, the county providing only the standards, balances, and stamps. The allowance of a portion of the fines induces an inspector to look after his duties. Custody of the standards; period of reverification. Beams and scales for out-door inspection are adjusted once a month, q. 1295–1336, 1420.

Keeps an account of fees received for stamping, and rough notes of inspections, an abstract of the latter being laid before the petty sessions. All new weights and measures in the district and those which have been re-adjusted are brought for examination, and if correct are stamped. Adjustment done by the makers. Adjustment by inspectors is a bad system. Process adopted for comparison of weights; never used a counterpoise. Weights are generally accurate. Allowance of error; a 56 lb. weight would be passed if within 6 drams. Never stamps any under weight, nor of other than official denominations. It is doubtful whether the inspector ought to stamp troy weights, but it is absolutely necessary that it should be done, 1337–1372.

In the event of the Metric System being legalised, no inconvenience would arise if the weights were different in form from those at present in use. It is not requisite that balances should be stamped. Continuance of troy weight concurrently with the Metric System would not make any difference; avoirdupois is sufficient for all purposes of trade. If troy weight were abolished chemists would take to avoirdupois. Mode of examining measures of capacity. There is a great system of fraud with glasses used by publicans; the law on this point wants amending very much; all such glasses should hold Imperial measures, and might be marked with a diamond instead of being stamped. This might also be done with earthenware mugs, which are very much used throughout the country; at present they need not be stamped. Milk measures when of Imperial standard are stamped; any not of legal subdivisions are seized. Method of stamping liquid measures, 1373–1411.

Ordinary denominations of measures of capacity for dry goods inspected and tested; method of testing. Measures of length tested. There is no reason why subdivisions of the yard, &c. should not be compulsorily stamped. Has no regular system laid down for visiting the district; extent of district. St. Pancras, St. Marylebone, and Paddington are within the district, but they have annoyance juries, and are therefore not interfered with. The 25th section of 5 & 6 Will. 4. gives a certain right of inspection in these cases, but has never been asserted, the clause is so ambiguous; it clashes with the 45th section. A part of the Duchy of Lancaster is also part of the district, where also a jury is appointed. The sooner these annoyance juries or courts leet are abolished the better, 1412–1430.

Sellers at street stalls, such as in Leather Lane and Seven Dials, are very sharp practitioners. There are no markets in the district, 1431–1433. Never met with any Metric weights and measures; has met with weights and measures not having an official denomination, such as 3 lb., 5 lb., and ¼ gill, which were seized and convictions followed. Cases of defective weighing machines used by coal retailers and bakers. Amount of errors allowed in weights and measures on inspection. There is no occasion to seize beams and scales or weighing machines. Mode of testing lever weighing machines using special weights. A scale which does not show an error with a 56 lb. weight might be defective when weighing large quantities, but there is no legal means of testing, 1434–1448.

Balance balls are altogether unnecessary, although a very convenient mode of adjustment; the greatest objection is that they are not used for the purpose intended. Balances may be adjusted by tradesmen without the balance ball. If the balls were fixed they would be equally objectionable, as being a means of fraud, 1449–1454. It would be very beneficial to the public if inspectors were authorised to detect and inform against frauds in the method of weighing; the greatest frauds exist in weighed-up parcels. A regulation compelling the weight to be marked on the parcel would make the seller more careful, 1456–1458. Witness always makes a distinction between wilful and unintentional fraud, and the magistrates ordinarily inflict heavier penalties where the fraud is wilful. There should be a minimum penalty; now a fine of 1*s.* can be inflicted, which people frequently care nothing about. Publicly advertising the names of persons convicted would be a great protection to the public, as tradesmen dread publicity more than anything else; witness, however, does not think its adoption advisable. In St. Pancras the names are advertised after a certain number of convictions, 1460–1466.

Police officers are unsuitable for the duties of inspection; inspectors specially appointed are the best. As to adoption of the French system of separating duties of stamping from inspection, inspectors can do both. Duties of inspector are easily learnt. Comparison and stamping of gas meters had better be left by itself. The Petroleum Act authorising inspectors of weights and measures to be inspectors of petroleum is a dead letter; it provides no remuneration nor apparatus. Inspectors might learn what relates to adulteration of food, but they must first acquire a knowledge of chemistry, 1467–1474.

A general code of rules would be advantageous, although many circumstances must occur depending on discretion of the inspector. Not the least objection to local inspectors being required to furnish periodically to the Board of Trade information as to the discharge of their duties, 1475–1477.

In Middlesex much difficulty arises from the 27th section of 5 & 6 Will. 4. as to weights and measures which have once been stamped being legal throughout the United Kingdom. The inspectors of one county do not know the stamp of another; all weights and measures should be stamped for use in the county. Inspectors ought to be provided with proper and secure stations and all the necessary apparatus for carrying on their duties. It would be very beneficial if a Government officer were appointed to supervise the apparatus and see that the instruments were in proper order. Justices when inflicting fines like to take an easy view of many small cases, and the fine is often nominal. Practice as to costs before the justices varies in the several divisions. Inspectors' duties do not include weighing of bread and cases under the Coal Act. Desirable that authority should be given to interfere in these cases, and that inspectors should have power to enter distilleries to test measures, and railway stations to inspect weights and weighing machines. Receipts and expenditure in Middlesex on account of inspection for the last three years. In any bill that may be introduced a clause should be inserted conferring pensions on the inspectors, 1478–1487.

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Inspectors of weights and measures specially appointed are better than policemen; *Morrison*, III. q. 1469.
No objection to policemen being inspectors of weights and measures; *Short*, III. q. 1682.
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Chief constables should appoint inspectors of weights and measures if police are employed; *Strugnell*, III. q. 2045–2049, 2052.
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No slackness on part of constabulary in inspection of weights and measures; *Harris*, III. q. 2651.
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Every tradesman should register with police number and kinds of weights he intends to use; *Roberts*, III. q. 2731.
Should test weights and measures at each petty sessional division, and charge a fee for so doing; *Roberts*, III. q. 2731, 2763–2765.
Superintendents of police inspect weights and measures in Breconshire; they are appointed by the magistrates; *Roberts*, III. q. 2737–2742, 2744, 2782–2787.
No fear of their being bribed; it would soon be detected; *Roberts*, III. q. 2791–2794.
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Employment of police as inspectors of weights and measures necessary at present; *Tilson*, III. q. 3057–3059.
Remuneration for duties as to weights and measures; *Tilson*, III. q. 3060, 3061.
Transfer of inspection of weights and measures to Royal Irish constabulary has worked well; *Harvey*, III. q. 3066, 3067, 3069.
Transfer of inspection of weights and measures by Dublin metropolitan police; *Harvey*, III. q. 3068.
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Irish constabulary do not receive special pay for inspection; *Harvey*, III. q. 3073.
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No balances in equipment of Irish constabulary, which is a great defect; *Harvey*, III. q. 3109, 3110.
System of books and records kept by Irish constabulary as to inspection of weights and measures is defective; *Harvey*, III. q. 3111.
Irish constabulary do not inspect gas meters; *Harvey*, III. q. 3123.
In Ireland may enter shops without written authority; *Harvey*, III. q. 3125, 3126. Power to do so checks use of unjust weights; *ib.* q. 3127.

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On ⅓ oz. and ⅔ oz. weights for French postage; IV. 317–321.
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POUND:
The Prussian unit of weight; its equivalent in English weight; II. 113.
The pound, the unit of weight in Russia is equal to 0·40952 kilogram; II. 100.
Decimal equivalents of an Imperial pound, troy and avoirdupois, in Metric denominations; II. 133.
No legal standard of the pound troy before 1824; III. 146.
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Reverification of five of these new weights after readjustment; v. 70.
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Standard temperatures and barometric pressures adopted in comparisons of commercial standard Imperial pound and other weights; v. 210.

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*See also* TOWER POUND.

POUND AVOIRDUPOIS. *See* AVOIRDUPOIS WEIGHT.

POUND STERLING. *See* SOVEREIGN.

POUNDE TOWRE. *See* TOWER POUND.

POWNALL, JOHN FISH, ESQ. (*Analysis of his Evidence*), III., p. 127.
Chairman of the Holborn Special Sessional Division of Middlesex, q. 2931–2933.
Local justices do not appoint inspectors of weights and measures; it is done by the quarter sessions. Middlesex is divided into four districts of inspection of weights and measures, with four inspectors. The practice is to reappoint every year, so that if complaint was made it would be taken into consideration on re-appointment. No control exercised over the inspectors beyond receiving and verifying the annual accounts. The inspection in Middlesex is partly under the magistrates, partly under the vestries of four parishes, and partly under the local authorities of Westminster and the Tower district; they should all be assimilated. No annoyance juries in the Holborn district; the system should be abolished wherever it exists. Not advisable to place inspection of weights and measures under the police. Unless the hearing and adjudicating on weights and measures cases were withdrawn from the magistrates great difficulty would be experienced with the police. A more serious objection is that in the metropolis two-thirds or three-fourths of the cases are against licensed victuallers for defective pots, and it is most unadvisable that the police should have more to do with public houses than is absolutely necessary. If the police are appointed a special number must be told off for the duty, which would transfer the appointment from the magistrates to the Chief Commissioner. If policemen were seen in uniform they would not be able to discover a case, and it is not desirable that policemen should execute their duties in plain clothes further than the exigencies of justice may require. They should be kept for what may be strictly called police duties, 2934–2951.
Middlesex magistrates declined undertaking the inspection of gas meters on the ground of expense; it would have been much better retained by the county magistrates. No unwillingness exists on the part of the magistrates in carrying out the weights and measures law. Middlesex inspectors are paid by salary, and a portion of the fines. One disadvantage in allowing part of the fines as remuneration is that in cases where the parties cannot pay the fines committal follows, and the inspectors in that case get nothing, although they have had to pay the expenses. Offices have to be provided at cost of the inspectors. Offences against the weights and measures law are adjudicated in petty sessions, with a power of appeal to quarter sessions, not in the police courts. No retiring pension allowed to the inspectors. System pursued in bringing offenders before the magistrates; they cannot be brought up in a summary way. A classified return of convictions should be made periodically to the Board of Trade. About eight per cent. of the cases are fraudulent, and a great number are cases of negligence more or less gross. It is advisable that the inspectors should have power to seize incorrect or defective balances, 2952–2983.
Magistrates have not power to order costs in convictions for false weights and measures. It is not advisable that magistrates should have a discretionary power to dismiss cases, there being in all some degree of negligence; a shilling fine is better. It would be highly objectionable to transfer the appointment of inspectors to the Metropolitan Board of Works; the inspectors should be appointed by the justices, and the administration of the law should continue in their hands. There is no object in separating duties of verification from inspection. Local authorities should be *directed*, not simply *empowered*, by law to provide proper offices for inspection. Powers of inspection should extend to post offices, which are at present exempt, 2984–3001.
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On police as inspectors of weights, &c.; IV. 402.
On transferring authority over verifiers, &c. to Metropolitan Board of Works; IV. 407.
On remuneration of inspectors; IV. 408.
On advertising fraudulent tradesmen; IV. 414.

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Weights so used appear to be the old nest set of ounce weights established by Queen Elizabeth; III. *Rep.* § 5, p. iv.
Existing legal troy weights not generally used; III. *Rep.* § 5, p. iv.
Are sold by troy weight; *Morrison*, III. q. 1384.
*See also* GOLD AND SILVER. TROY WEIGHT.

PRECIOUS STONES:
Diamonds, emeralds, pearls, &c. are valued by weight; III. 152.

PRECISION, WEIGHTS OF:
In Germany; IV. 340, 342, 355.
Fees for verification of, in Germany; IV. 372.

PRESTON:
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*See also* KILOGRAM. METRE.

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The foot, the unit of length in, till 1839, when a new standard three-feet bar was legalised as the unit of length; II. 112.
The Prussian unit of weight; II. 113.
Prussian measure of three feet is verified in; *Skinner*, III. q. 684.
Supervision of local standards in; similar system recommended; IV. 3.
Recommendation of system of inspection similar to that of; IV. 395, 397.
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Frauds by, in use of glasses; *Morrison*, III. q. 1392, 1397, 1398.
Should not be allowed to use measures without the contents being marked upon them; *Roberts*, III. q. 2817, 2819.
Very large number of cases of defective measures used by, are accidental; *Pownall*, III. q. 2951.
Cases of wilful fraud not numerous; *Tilson*, III. q. 3046.
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PUBLIC STANDARDS. *See* MURAL STANDARDS. STANDARDS.

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The quadrat-stab, or square meter, the unit of superficial measure in North German Confederation; II. 110.

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Standard commercial and money weights of, collected in 1818 by British Government, duly verified, and deposited in Standards Department; v. 225.

RING WEIGHTS:
Get out of order sooner than brick weights; *Skinner*, III. q. 700.

ROBERTS, MARTYN, ESQ. (*Analysis of his Evidence*), III., pp. 117–123.
A magistrate of the counties of Brecon and Monmouth, and deputy-lieutenant of Breconshire, q. 2709.
There are one complete set of standard avoirdupois weights and measures of capacity and a standard yard for the county, and the like for the borough of Brecon, but no standard troy weights, nor decimal bullion weights. Troy weights should be examined by the inspectors in the same manner as avoirdupois. Subsidiary standards are supplied to each petty sessional division, made of iron coated with zinc. This was a mistake, as the zinc rust was easily rubbed off. If glass were made non-absorbent of moisture it would be a good material for local standards. The county standards were once 12 years without reverification; they were last verified in 1868. Government inspectors should travel the country once or twice a year, and verify the local standards at [illegible]nty town. Witness puts in a letter addressed by him to the Commission, suggesting a plan for the better inspection of weights and measures throughout the kingdom. A set of standard weights and measures should be kept at every petty sessional division, and at police stations in villages very distant from a petty sessional court. A trifling fee should be paid to the police for each testing. At present the approach of the inspector on his rounds is known, so that false weights are hidden from him. Every trader should register himself at the police station, stating the number and kind of weights in use. The police should visit, at uncertain intervals, the premises of each registered trader, at least once in three months. Constables should have power to seize all goods made up for sale if deficient in the pretended weight. French system of placarding the name is objectionable. County inspectors should be abolished, and two or three Government "general inspectors" be appointed for the whole kingdom. Borough tradesmen should be open to inspection by the county police. All false scales under 5*l.* in value should be seizable, 2710–2732, 2763–2769, 2795, 2802.
Population of Breconshire; number of shops and public houses. The inspection of weights and measures is carried out by the two superintendents of police. They go round the country with a horse and cart, taking the standards with them, and having the assistance of some private constables. This system has existed ever since the Rural Police Act was brought into force. Before that time there were six inspectors appointed by the magistrates. Number of weights and measures compared in 1867 and 1868; number seized in those years. A register of these operations is kept by the inspectors. No instructions are issued to the inspectors; the matter excites very little attention among the magistracy. Difficulty in convicting in cases of fraudulently weighed up goods; how it may be met. Clerks of markets have power to seize weights in the market; this power should be extended to the police not only in markets and open places but also in shops. The police do not receive any portion of the fines; half goes to the county and half to the police superannuation fund. The seller of false weights and measures is liable to a penalty, but this is scarcely ever acted on. Every measure should be plainly marked so as to show its contents. Stamping is unnecessary, but every facility should be given to the tradesman to test his weights by the standards. The Brecon magistrates convict on a very small deficiency, for which there is no fixed rule; it is in the discretion of the sitting magistrates, as is also the amount of the fine. The custom in Wales of selling certain things by the pounds of 18 or 20 ounces is not quite given up. No applications have been made to sanction weights other than those recognised by the Imperial System, 2733–2762, 2770–2779, 2796–2799.
Iron weights should not be used for tradesmen; if it were possible, without being a hardship, all weights should be of some non-oxidisable material. The superintendents of police who act as inspectors of weights and measures have an allowance of 4*s.* a day for travelling expenses, and 5*s.* a day for their horse. The system of paying by allowing part of the fines is undesirable; anything that is a bribe to a man to convict is a bad thing. No reason for expecting slackness when they are not so paid. Any attempt to bribe not to seize would be immediately detected and reported, 2780–2794, 2800, 2801, 2821–2824.
There is no reason why there should be power to seize weights but not scales and balances. Seizure of balances would stop the trade, but a fraudulent trader ought to be stopped. Balance balls should not be used; a scale should be adjusted truly and be unchangeable; anything not an integral part of the scale is illegal. Penalties should not be graduated by the amount of loss to the buyer; the punishment is for the crime. The onus of adjusting should be on the tradesman; it is not advisable that inspectors should be allowed to adjust, 2802–2820.
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Decimal equivalents of a perch or rod in Metric denominations; II. 131.

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*See also* BALANCES.

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Of 5759·2 grains divided by the Romans into 12 ounces; III. *Rep.* § 4, p. iii.

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Metric system wholly adopted in the Papal States; IV. 436.
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A series of old French cup weights of laiton, weighing together 8 lbs. of the old Poids de Marc of Rouen, deposited in the Standards Department, Board of Trade; V. 225.

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New shilling proposed by Astronomer Royal; amount of alloy; advantages if proposal carried out; millesimal expression of fineness of; III. 154.
*See also* COIN WEIGHTS.

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SHORT, MR. SAMUEL ROBINSON (*Analysis of his Evidence*), III. pp. 44–48 and 65–73.

A member of the firm of De Grave, Short, and Fanner, III. q. 1013, 1014.

Local standards generally composed of brass or iron: average cost. A few sub-standard weights are made for Ireland; galvanised iron weights for inspectors not advisable, 1015–1020.

Condition of local standards when sent for re-adjustment depends upon wear and tear. Sometimes they are very much knocked about; much depends, however, on the inspector who uses them. Amount of error, about 50 grains in 56 lbs. on the average, 1022–1026, 1698.

Commercial avoirdupois weights principally made of brass and iron, the iron weights being square, ringed, and cylindrical, and brass ones bell-shaped or flat; gun metal wears better. Cost of a set of shopkeeper's weights. Condition of weights when sent for re-adjustment depends rather upon the trade; where salt goods are sold weights corrode and get very light. Amount of error. Weights are generally fairly used, tampering with them is very rare. Cases of fraudulent error. Cost of adjustment. Maximum proportion of error from fair wear and tear. Adjustments are made, as a rule, twice a year, 1027–1060.

London inspectors do not allow use of intermediate weights, such as 3½ lbs., 1061–1067.

The only troy weights that are stamped are those from 12 oz. downwards. Inspector of the A. E. division in Surrey has a set of decimal troy weights from 100 oz. down. Founders' Company profess to have a charter to stamp brass weights throughout the kingdom; all weights stamped at Guildhall must first be stamped at Founders' Hall, 1069–1072.

Silversmiths generally keep their weights and balances correct, 1074.

All weights should be stamped, but there is a jealousy about it, through some of the local inspectors being paid by fees; local inspectors have passed bad weights which had their own stamp on, 1076–1080.

French Metric weights are hexagonal, but it is more convenient and cheaper to make them round. Best mode of distinguishing Metric from Imperial weights in event of the Metric System being permissive. Objections to the French series; series suggested instead. Cost of set of Metric weights. Conversion of Imperial into Metric weights could not be done; they bear no resemblance. General remarks, 1085–1092.

City of London adjust the standards every year, so also Liverpool; county of Surrey every two years, and Middlesex about the same, 1094.

(*Further Examination.*)

Cost of set of balances used by inspectors for testing weights. Generality of inspectors are very backward in having their scales and weights put in order. Cost of adjustment. Balances furnished to inspectors quite sufficient for due discharge of duties. Steelyards are not adapted for inspectors; it is a mere matter of guess. Balances lose their sensibility by mere wear and tear, 1488–1510.

Sizes of balances supplied to inspectors. 1 dram and ½ dram standard weights are very rarely used by inspectors. A 56 lbs. balance would fairly indicate 5 grains; a 7 lbs. balance, 2 grains. Steelyards are generally made upon the principle of accelerating beams; they may be used so as to weigh tolerably correctly, within half a pound more or less, 1511–1516.

A set of standard weights being shown to the witness, he considers them in a disgraceful state. The inspector appears to have adjusted them; the adjustment can be picked off, 1517–1521.

SHORT, MR. SAMUEL ROBINSON—*cont.*

Inspectors' balances do not have face plates; they would not stand the wear and tear. Balances used by tradesmen vary in their quality, those in poorer neighbourhoods being of an inferior kind. Weighing machines are not stamped; there are no means of testing them as in the case of weights and measures, 1522–1535. No utility in stamping them, as the balance which is correct to-day may be wrong to-morrow; it would be a troublesome thing and would answer no good end. The principle in the case of gas meters is very different, 1550–1561. The stamp would be a guarantee that the balance was correct once, as is the case in liquid measures, 1633–1638.

Great misapprehension exists about balance balls; they are the best things that can possibly be for all honest men. The decision of the Court of Queen's Bench is foolish, and it would be a great benefit if it were reversed. In the city of London for many years balance balls have been recommended by the magistrates, 1536–1543.

Tradesmen are generally anxious to keep their balances in proper order. The cost of adjustment depends upon the trade and the number of scales used. Cheesemongers and butchers' scales are more often out of order than in other trades, from the nature of the articles weighed. Balance balls are therefore recommended, 1544–1549.

Counterpoises for lever weighing machines should be of a particular weight. Mode of adjusting lever machines by altering the lever to the weight. With regard to machines for weighing coals, one inspector considers those with scoops illegal, whilst others believe he is mistaken in his interpretation of the law. Official regulations as to the mode in which inspectors should perform their duties according to law are very desirable, 1562–1575.

Local standards of length are generally made of brass or gun metal; their cost. The proposed standards of sub-divisions of yard and foot and inch might be marked upon the existing standards with flat faces; no difficulty or confusion would arise, 1585–1589. Commercial measures of length are usually made of lance wood; they and their subdivisions are fairly accurate. Our plans cannot be altered much in establishing a practical mode of distinguishing Metric from Imperial measures of length, 1591–1598.

A standard similar to that on the wall at the gate of the Royal Observatory, Greenwich, near some public building in London, such as the Houses of Parliament, would be an advantage, 1599–1602.

Sub-standards of capacity for Ireland made of iron are not verified in the Standards Department; their accuracy entirely depends on the maker. Cost of a set, 1603–1612.

Commercial measures of capacity for liquids are made of various kinds of metal according to the purpose for which required; their cost, 1613–1625, 1629–1632. The introduction of the French system requiring measures of capacity for liquids to be made of a specified metal and of a specified form would be very desirable, 1627.

Commercial measures of capacity for dry goods are always made of wood, and usually cylindrical in form; the price varies according to the quality, 1639–1646. Amount of error allowed by maker in adjusting weights. Weights belonging to makers not subject to inspection, 1649–1652.

Inspectors generally speaking are intelligent men, and but little fault can be found as to the mode in which they discharge their duties. They should not be allowed to adjust weights—it leads to great evil. Inspectors cannot seize a stamped weight unless defective or unjust. There is no inconvenience from stamped weights being legal throughout the kingdom. Inspectors ought to be paid a decent salary to make them independent of fees. It is hardly likely that they would seize as false a weight they knew to be true, as it has to be proved before the magistrates. Payment by salary would not make them too indulgent: inspectors in the city of London are paid by salary, and do their duties fearlessly. False balances as well as weights should be liable to seizure, 1653–1681, 1707–1709.

Inspectors of police very suitable as inspectors of weights and measures. Duties of the Standards Department are done in the very best manner. Provisional scale of allowance now in force is too much; there should be no allowance for deficiency. Period for reverification of weights is too long; five years is long enough for measures, 1682–1700, 1703–1706.

Recommendation that Standards Department should verify all weights and measures brought to it will not be of public advantage, 1701, 1702.

SHORT, MR. SAMUEL ROBINSON—*cont.*
On police as inspectors of weights, &c.; IV. 402.
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On stamping of balances, &c.; IV. 412.
On balance balls; IV. 412.

SHORT WEIGHTS. *See* FALSE WEIGHTS AND MEASURES.

SHUCKBURGH SCALE:
Shuckburgh's determination of weight of water; confirmed by Kater; II. 127; since legalised; II. 128.
Now accepted in France, forming the base of the legal Imperial equivalent of the litre; II. 128.
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Adjustment of Kater's four standard yards with gold points on the Shuckburgh scale; v. 102.
Comparison of, with Bird's Standard of 1760; measurement of British yard with French mètre based on; v. 149.
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SICILY. *See* ITALY.

SIERRA LEONE:
Verification of Imperial Standards for; IV. 20.

SIKES'S HYDROMETER. *See* HYDROMETER.

SILBERMANN, M.:
His report on the process of the verification of local metric standard weights and measures in France; II. 37.

SILVER, SILVER PLATE:
Standard fineness of, in the pound troy; millesimal expression of standard fineness; III. 153.
Silver plate always sold at per ounce; III. 151.
Allowance of error in weighing silver; IV. 31.
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SILVER COIN WEIGHTS:
Scale of errors to be allowed in official comparisons of copies of Standard Imperial silver coin weights; v. 214.
Construction and verification of new standard silver coin weights; v. 249.

SILVERSMITHS:
Silver trade have no objection to abolition of troy weight; *Heaton*, III. q. 144–146.
Manufacturing silversmiths in Clerkenwell use troy weights exclusively; *Houle*, III. q. 228–232.
There would be no advantage to, in adopting a different form of weight; no inconvenience arises from adopting troy weight for one purpose and avoirdupois for another; *Houle*, III. q. 236–239.
Metric weights of no use in silver trade; they would not be easily learnt by those who understand troy weights; *Houle*, III. q. 245–248.
Ordinary business of silversmiths all done in factories; *Houle*, III. q. 249-252, 255, 256.
Where gold or silver is given to the workman it is weighed, and also when returned; *Houle*, III. q. 258–260.
Very few trades where weights are so much used as in the silver trade; weights are tested three or four times a year by the London scalemakers; *Houle*, III. q. 261–265.
The ounce and pennyweight only used in silver trade; *Houle*, III. q. 294–297.
*See also* GOLD AND SILVER SMITHS. METRIC SYSTEM.

SILVER WARES:
Statute for preventing excessive charge for gilding of; III. *Rep.* § 4, p. iii.
Generally sold by the article; silver spoons sold by the ounce; *Houle*, III. q. 313–316.
Oxydised silver goods never sold by weight; *Carter*, III. q. 3224.
*See also* GOLD AND SILVER PLATE AND WARES. GOLD AND SILVER TRADE.

SIX-FEET STANDARD BARS:
Description of; comparisons and verification of; v. 232.
Verification of standard 6-feet end bar by Astronomer Royal's method; v. 233.
Comparisons of 6-feet steel rod with bronze end standard yards, and reductions of comparisons; v. 233.

SIXPENCES:
Number to be coined in the pound weight troy of standard silver; III. 149.

SKINNER, MR. HENRY (*Analysis of his Evidence*), III., pp. 19–29.
A scale, weight, and weighing machine maker, q. 440.
Constructs and supplies local Imperial Standard weights made of a variety of metals, the price varying from 15*l.* to 20*l.* for the set of 56 lbs. to ¼ dram, 441–449. Occasionally makes sub-standard weights for use in Great Britain and Ireland and for other places. Galvanized iron objectionable for weights, as it becomes corroded by salt and acids; if made of iron and coated with pure tin they would wear much better, 450–453.
Local standard weights received for reverification before being sent to the Standards Office are sometimes deficient; as a rule they have not been adjusted in the localities. Errors in local standard avoirdupois weights not very great; perhaps half-an-ounce in 56 lbs. and so on downward, 454–462.
Avoirdupois weights are principally made of iron and brass; not 1 per cent. of the larger weights are made of brass. There is a variety of shapes, the square ring weight being the most usual and most convenient. Prices of such weights, 465–478.
Commercial weights when brought for adjustment in some cases are very light; those of butchers and cheesemongers are about the worst, of grocers next. The weights are generally fairly used; only unprincipled traders tamper with them, 479–486. Cost of re-adjustment of a set of weights. The inspectors in London never adjust; country inspectors do. The latter is a bad plan, as it renders the Act of Parliament null and void, for no inspector would expose a trader for fraudulent scales, weights, and measures while receiving payment indirectly from the tradesman; illustration of this. The metropolitan inspectors are free from practices of this kind, 487–490, 652, 654.
Greatest amount of error witness has found in avoirdupois weights; maximum amount of fair wear and tear. Tradesmen have complained of negligence of scalemakers, but they are cases in which trampers have been employed. Witness does not sell weights of other denominations than those of the official standards; such weights are not used in London, 491–501.
Troy weights are not stamped by the inspectors; they have no standards; it is not considered compulsory to have them officially stamped. Brass troy weights are all stamped at Founders' Hall. Witness thinks there is a set of troy standards at Goldsmiths' Hall, but troy weights are all sold unstamped, 503, 504, 514, 515.
Error in troy weight much greater in proportion than in avoirdupois; amount of error, 506–513.
All weights should be stamped; it would be the most important thing introduced into the country; illustration of this from weights produced by witness. If the stamping of weights were compulsory these would have been correct, 516, 517.
Concurrent use of two systems of weights would cause great confusion, unless the use of the Metric weight were made compulsory after three years. The confusion might be avoided by making Metric weights hexagonal, and forbidding Imperial weights to be made of that shape, 523–527, 531, 532.
Weights for commercial use should be few in number, so that their difference in size might facilitate recognition. Submits a division of Metric weights from the milligram to the myriagram, 56 lbs. avoirdupois being $\frac{1}{65}$th more than 25 kilos.; a similar series for Metric liquid measures from the millilitre to the dekalitre; cost of set of Metric weights, 528–530.
If the Metric System were compulsory the only weight which would require conversion is the 56 lbs. into a 25 kilo., the cost of which, including stamping, would be 1*s.* 6*d.*, 533, 534.
Average cost of scales for trial of 56 lbs.; cost of adjusting. Inspectors' scales are not properly constructed; they ought to have face plates instead of back shoulders. [Witness describes the face plates to the Commission.] Face plates prevent friction of the shoulder, and the construction is nearly perfect, 538–550.

SKINNER, MR. HENRY—*cont.*

Price of scales not a test of accuracy, 551–555. Convictions for inaccuracies principally in cases of weighing machines. The machines should bear the marker's name, and be officially stamped, the maker's name being a guarantee that the machine was steeled, and the official mark a guarantee of its accuracy. [Witness produces machines illustrating this portion of his evidence.] If all balances were tested and stamped no false machines could possibly get into use, 556–560.

There is only one system by which balances with an adjusting or balance ball may be constructed to prevent their being tampered with by the tradesmen. The balls should be soldered up, and then cannot be altered. The decision in Court of Queen's Bench against the use of balance balls was a very unpractical conclusion; the case was not fairly laid before the judge. The ball could only be taken away for purposes of fraud in large weighings. Greatest amount of fraud in witness's experience (40 years). Never heard of removing the ball. The use of the balance ball is a most important practical question. The ball ought to be allowed to be used, it is necessary, and the Queen's Bench decision should be reversed, so that a tradesman might have the power of adjusting his scales for his own protection and that of his customers, 562–574, 690–700.

Tradesmen's balances are generally kept in tolerable order; they do not require so often repairing as weighing machines; cost of repairing, 575–580.

All commercial balances, including weighing machines and steelyards, should be stamped. The French system of requiring machines to be adjusted to weights of legal Metric denominations is an excellent plan, and a similar system might easily be adopted in this country. Such weights are not subject to supervision here. If any alteration is decreed, it should be in favour of the Metric System, 581–591.

The great defect in platform weighing machines is that they are adjusted by weights for which there is no legal standard. In the case of steelyards and other lever weighing machines, the weight is made to suit the lever, which is a wrong system, 592–597.

Yard measures are not now stamped, except in a few cases in the city; those brought for adjustment vary very little. Brass is more suitable than iron for local standards. Proposal to mark subdivisions of the yard on the existing standards would cause confusion, 598–612.

Standard measures of capacity are mostly made of gun metal; those for commercial use of pewter, tin, &c.; cost of the latter, 618–631.

Metric measures of capacity for English use need not be made of any particular material; the French require a particular composition to prevent affecting the liquids measured, 633–638. Commercial measures of capacity for dry goods; their denominations; of what material constructed, and their cost. Mode of distinguishing Imperial from Metric measures of capacity for dry goods, 640–645.

There are many errors in the system of inspection, but as a rule it is excellent; practices of courts leet were very bad in comparison; the inspectors should attend to their duties of stamping and inspection and nothing else, 651–653.

Policemen not fitted for inspectors, nor is it desirable to incorporate police influence in the system of inspection, 655, 656, 662–664.

The duties of the Standards Department have been performed in every respect as they should have been, 659–660.

It is necessary that some one should inspect the inspector. Under the present system the inspector is left without any control whatever. The magistrates do not sufficiently attend to their duties. A uniform code of laws should be constructed, from which there should be no deviation. Board of Trade should appoint a few superintendents of inspectors; proposed powers of superintendents, 665–667, 685–689.

Official standards should be electro-plated with silver or gold to prevent oxidation. Present period for reverification of local standards sufficient. Proposal by the Commission that the Standards Department should verify any weights when called upon (at present the Department only verifying those for the use of inspectors) would entail an amount of trouble without a counterbalancing advantage, 670–683.

On selling coke by weight; iv. 295.

Suggestions by, as to inspection, &c. of weights and measures; iv. 397.

On separating verification and inspection; iv. 401.

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On official instructions of inspectors, &c.; iv. 409.

On official supervision of standards, &c.; iv. 409.

On verification and stamping of balances, &c.; iv. 411.

On balance balls; iv. 412.

On fraudulent weighed-up parcels; iv. 413.

On fraudulent usage of weights, &c.; 414.

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Verification of copies of Imperial Standards for; iv. 20.

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Inspectors' balances, and errors detected by them, in; iv. 200.

Seizure of false weights, &c., with penalties, in; iv. 212.

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SLOANE AND CARTER, MESSRS.:

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SMITH, MR. JOHN:

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SMYRNA:

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SOMERSETSHIRE:

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County police employed as inspectors of weights, &c. in; their salaries, &c.; iv. 403.

SOUTHAMPTON:

Number of sets of standards verified for; iv. 22.

SOUTH AMERICA:

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SOUTH AUSTRALIA:

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On unjust fining of tradesmen for short weights, &c.; iv. 263.

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SOVEREIGN:
Exact weight of in grains troy, in troy ounces, and in grammes; *Forbes*, III. q. 324.
Lowest current weight of; *Forbes*, III. q. 334.
Depreciation of, if worn to lowest current weight; *Forbes*, III. q. 335–338.
Depreciation of, if 125 were coined from kilogram of gold at the French standard; *Forbes*, III. q. 337, 338.
Appreciation of 8 grammes were adopted as weight of; *Forbes*, III. q. 339–341, 350, 352, 359.
Money calculations would be simplified if 8 grammes were adopted as weight of; *Forbes*, III. q. 339.
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Difference in value if made equivalent to a 25 franc piece; *Forbes*, III. q. 372.
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Alteration of, to 8 grammes would not simplify the decimal relation to the napoleon; *Forbes*, III. q. 402.
Is the pound sterling; estimated in troy weight; *Johnson*, III. q. 411.
By making the new sovereigns a little coarser and heavier they would be brought nearly to the value of the present sovereign; *Johnson*, III. q. 419.
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Cannot be used as ordinary weights; *Fowler*, III. q. 769, 770.
No difficulty in converting special weights now used for lever weighing machines to weights of legal denominations; *Forbes*, III. q. 771.
Many 3½ lb. weights were used at one time; abolished by Act in 1826; *Short*, III. q. 1066, 1067.
Those used for lever weighing machines should be of legal denominations; *Short*, III. q. 1562, 1563.

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Table of specific gravity of pewter, according to the proportions per cent. of pure tin and lead contained in it, in France; II. 63.
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SPOONS:
Silver ware are generally sold by the article; silver spoons are sold by the ounce; *Houle*, III. q. 313–316.
Silver forks, spoons, &c. are sold by weight if plain; if ornamented by the article; *Carter*, III. q. 3221–3223, 3227.
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Use of, in German measures of length; IV. 333.

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Recommendations in detail as to the staff, its duties, and salaries, of the Standards Department; v. *Rep.* p. xiii.

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Standards of commercial and money weights of, collected in 1818 by British Government, duly verified, and deposited in Standards Department; V. 225.

STEWART, MR. HORATIO (*Analysis of his Evidence*), III., pp. 1, 2.
A member of the firm of Messrs. Hancock, goldsmiths and silversmiths, q. 1, 2. Uses troy weight exclusively, 3–9.
Abolition of troy weight would be attended with inconvenience, as the trade would have to learn another measure; beyond that there would be no inconvenience, nor would the trade object if they found a more commodious system, 10–14, 35–40. If troy weight be abolished by law no period need be fixed, but some time should be given for the public mind to become accustomed to it, 15–18. If troy weight were abolished witness would prefer Metric weights, the nearest Metric equivalent to the ounce troy being substituted, 19–27. There would be no inconvenience in substituting a Metric equivalent for the troy ounce with regard to the duties on gold and silver plate, 30–34. Weights used by dealers in gold and silver wares have never been inspected, but there is no reason why they should not be; an honest trader ought not to mind it, 41–44.
It would not do to apply the avoirdupois system to the business of goldsmiths. The advantage of the Metric System is that it is a good means of calculation, and is simpler than the troy calculation. The great majority of the trade would rather remain as they are. Introduction of the Metric System in lieu of the troy in the gold and silver trade would be an advantage, as introductory to the Metric System throughout the country generally, which would be advantageous, and it might be easily learnt, 47–54, 58. Most customers have an accurate knowledge of troy weight, 55–57, 61, 62. No loss arises in dealing with foreign countries in consequence of difference in mode of calculation, it causes no necessity for additional clerical assistance. Any one of ordinary comprehension can find out the value under the French system as compared with the English without difficulty, 59, 60. No difficulty in stating assays by per-centage instead of by carats: the matter would be simplified by doing so, 63, 64.

STIRLINGSHIRE:
Verification of copies of Imperial Standards for; IV. 18.
Standards requiring reverification in; IV. 25.
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STOCKHOLM:
Standards of commercial and money weights of, collected in 1818 by British Government, duly verified, and deposited in Standards Department; V. 225.

STONE:
Probable origin of the stone weight (14 lbs.) for flour; V. *Rep.* § 12, p. vi.

STRACHEY, COL.:
His proposals for reforming Indian weights and measures, based on Metric System; II. 95.
Dissent by, to report of Central Committee; II. 96.
Further papers in reference to Col. Strachey's proposals; II. 97.
His proposals objected to by Mr. Prinsep; II. 98.

STRASBURG WEIGHING MACHINE:
Construction, &c. of; IV. 361, 364.

STRAW:
Duties of inspectors of weights and measures with respect to sale, &c. of; IV. 417.

STRICH:
The strich, or millimeter (or line), of the North German Confederation; its equivalents in Imperial and Metric measurements; II. 110 (and *note*).

STRUGNELL, MR. JAMES (*Analysis of his Evidence*), III., pp. 80–86.
Inspector of weights and measures for the A. West Metropolitan District of the county of Surrey; limits of district; its population; number of places visited. Prior to appointment was superintendent of police and inspector of weights and measures in the county of Lincoln, and had been constable under Capt. Harris in Hampshire, where he acted as assistant to the superintendent in inspecting weights and measures. Has no instructions as to his duties, simply acts under the Acts of Parliament. Gross salary, including moiety of the fines, from 450*l.* to 470*l.*, out of which wages of assistants, office rent, and other disbursements have to be paid, leaving a net annual average remuneration of about 300*l.* Proceeds of sale of false weights, &c., are paid over to the county treasurer, q. 1917–1941, 1959, 2000–2002, 2057.
Does not adjust weights or measures, nor re-stamp any if the old stamp is perfect. Practice in Bath is a very fair system, but stamping every half year is not advisable. A regulation that the stamps should show the date of the year would work very well, 1942–1958. In allowance of error in weights sent for comparison, witness would allow about 3 drams in a 56 lbs. weight, and so on in proportion downwards. There are few glass or earthenware weights in the district, and would refuse to stamp them; stamps pewter measures with glass bottoms, 1960–1964.
Has no particular system in visiting his district, except with regard to seizures. Publicans and chandlers' shops are more frequently visited than wholesale houses. Weights, measures, and balances in the streets are not so defective as might be expected. Statement that a ham shop in the Clapham Road had not been visited for 20 years incorrect. The shopkeeper was summoned on 16th June 1869, and fined 1*l.* for having a balance ball 4½ drams against the purchaser and the spire of his beam out of the upright, 1965–1990.
Very few Metric weights used in the district; one lot was seized, but the magistrates ordered them not to be interfered with; this was before the opinion of the law officers of the Crown had been taken as to the legality of the seizure, 1991–1999. Never came across any weights and measures other than those for which there are official standards. Very little difficulty in execution of duties. Allowance of error in case of defective weights, &c. depends upon the trade carried on; in poor districts, where so small a quantity as an ounce is sold, would not allow a quarter ounce in the scales. In the case of measures of capacity a measure deficient an ounce in the quart would be seized, 2003–2020.
Inspectors are not authorised to seize balances; it would be a bad plan if they were, as it would prevent the shopkeeper from carrying on his business. Mode of inspecting steelyards. Does not interfere with balance balls, nor with balances of special construction for weighing coals if they are correct. Inspectors should be empowered to detect all frauds in connection with methods of weighing and in making-up beforehand. A difference is made in cases of wilful fraud; the magistrates then fine heavily. In cases of wilful fraud or culpable negligence the names of the offenders should be advertised, 2021–2036.
Employment of police officers as inspectors of weights and measures would be advantageous, if they had no police duties to perform. They should be placed under the chief constables, who would take care to select good men and see that the duties were properly carried out. In the metropolitan districts the inspectors are appointed by the magistrates; in the country districts

STRUGNELL, MR. JAMES—*cont.*
they are selected by the chief constables and bound over by the magistrates and the appointments confirmed by them. Police officers acting as inspectors of weights and measures receive a trifling remuneration, but they should be properly paid. Half the number employed in Lincolnshire at present would suffice if they attended to duties of inspection only, 2037–2056, 2058–2061.
Separation of duties of comparison and stamping from inspection not expedient in this country. It would be beneficial if the stamping were done by one man for the whole county without regard to district. Several places for stamping would be required. Great difficulty in country places in getting weights properly adjusted. Inspectors should not be allowed to adjust weights. Japanning rough iron weights should not be allowed, but witness can see no way of preventing it. Officers engaged in comparison, &c. of weights and measures should not be allowed to follow any other occupation. Inspectors ought to undergo an examination to test their knowledge of weights, scales, and measures, although there is not much to learn, 2062–2091.
Present duties as to inspection of gas meters might be undertaken by inspectors of weights and measures, 2092–2095. Inspectors want Government instructions; there are scarcely two in the metropolis who work alike, and probably throughout the country there is a greater divergence of action. No necessity for the appointment of Government officers to supervise the standard apparatus, and operations of the local inspectors; the inspection might perhaps be carried out a little better. Law as to reverification of the standards is not complied with; mode suggested of enforcing it. Inspectors should be required to furnish Board of Trade periodically with information similar to that required for the Commission in 1866, 2099–2111.
On reverification and inspection; IV. 401.
On police as inspectors of weights, &c.; IV. 402.
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Sometimes made for India and the colonies; *Skinner*, III. q. 450–452.
Of capacity made principally of gun metal; cost of a set; *Skinner*, III. q. 616–622.
Only legal in Ireland; *Fowler*, III. q. 848.
Made of galvanized iron, answer very well; *Fowler*, III. q. 849–851.
Used by inspectors in Ireland, are not verified at the Standards Department; *Fowler*, III. q. 992; *Short*, III. 1605.
For Ireland are made of iron; *Short*, III. q. 1607, 1612.
Cost of; *Short*, III. q. 1610, 1611.
By whom adjusted in Ireland; *Harvey*, III. q. 3147, 3148.
Of iron cannot fairly be called standards; *Harvey*, III. q. 3149.
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County police employed as inspectors of weights, &c. in; their salaries, &c.; IV. 403.

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Gross and net weight in selling; IV. 294.
Adulterated sugar from Cheltenham; IV. 303.

SUGG, MR. WILLIAM:
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*See also* INSPECTORS.

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Should be appointed; *Skinner*, III. q. 667; *Fowler*, III. q. 833–835.
Appointment of, by Board of Trade, not necessary; *Ledger*, III. q. 1280–1282.
Of weights and measures not necessary; *Strugnell*, III. q. 2102, 2103.
Should be appointed; uniformity of weights cannot be secured without them; *Mellor*, III. q. 2375, 2376.
Appointment of, not objectionable, but unnecessary; *Harris*, III. q. 2617.

SUPPLEMENTARY WEIGHTS:
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SURFACE, MEASURES OF:
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SURREY:
Standards are adjusted every two years in; *Short*, III. q. 1094.
Extent of Newington district of inspection of weights and measures; *Daws*, 1759–1761.
Inspectors of weights and measures appointed by justice in; *Strugnell*, III. q. 1923.
No parts of Surrey exempt from jurisdiction of magistrates as to inspection of weights and measures, except Guildford and Kingston; *Tilson*, III. q. 3014.
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Report of M. de Talleyrand on the confusion of weights and measures in France; II. 16.

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THERMOMETRIC TEMPERATURE. *See* TEMPERATURE.

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Objection to legalising; V. 9.
*See also* STANDARDS. WEIGHTS.

THREEPENCES:
Number to be coined in the pound weight troy of standard silver; III. 149.

TILLEY, MR. *See* POSTMASTER-GENERAL.

TILSON, SIR THOMAS (*Analysis of his Evidence*), III., pp. 132–134.
Chairman of the Surrey Quarter Sessions, and formerly chairman of the Newington division, q. 3002, 3004.
Inspectors of weights and measures are appointed by the county magistrates. Newington division, to which witness's experience is confined, is one of the largest in the metropolis, and has been better worked than any other. Magistrates have power to remove inspectors if they think them incompetent, but it has not been exercised. No part of Surrey (excepting Guildford and Kingston) is exempt from the jurisdiction of the county officers. There is no objection to the employment of police in inspection of weights and measures. Employment of the county police for purposes of inspection is at present necessary; it works well. Police receive remuneration, 3003–3019, 3022, 3057–3061.
It is desirable that the inspection of gas meters and of weights and measures should be under one jurisdiction. Why the Surrey magistrates declined the appointment with regard to gas meters was that they did not know the proper men to appoint; not on the ground of expense. Inspectors in Newington are paid by salary and half the fines. The allowance of half the fines is very objectionable. A system of supervision is needed; the present inspectors perform their duty well, but supervision is advisable on principle. Amount of inspectors' salary and emoluments, out of which the expense of office rent, &c. has to be paid. The stamping done at the offices should be inspected. It is not done at present. The inspectors produce their standards before the bench once a quarter. Cases of information are brought before the magistrates, not the police courts. There is a power of appeal, but it is not resorted to. About one fourth of the cases are of wilful fraud; publicans' measures about one fourth, and in such as chandlers' and bakers' shops one-half. The law does not at present authorise the inspector to seize a balance, but he certainly should have that power. Magistrates have no power to dismiss trivial cases; in them the penalty is merely nominal. If a case were dismissed with a caution, the weights would not be condemned. Doubts whether magistrates have power to superannuate inspectors; if not, they ought to have it, 3020, 3021, 3023–3056, 3062.
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Bottoms of those used in Manchester must be perfectly flat; *Mellor*, III. q. 2698.
Measures of tin re-stamped annually in Sardinia; IV. 396.
*See also* PUBLICANS.

TINNED WEIGHTS:
Tinning of weights better than using galvanised zinc; *Skinner*, III. q. 453.

TIN PLATE MEASURES:
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TOLERANCE WEIGHTS:
Use of, in Germany; IV. 340.

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Small shopkeepers manifest as much desire about their weights as the higher class; in poor neighbourhoods either do not adjust their weights or have them done in the neighbourhood; *Fowler*, III. q. 901, 902.
Weights used by, generally made of iron, a few of porcelain, and some of brass; *Short*, III. q. 1032.
Generally anxious to keep their scales in order; *Short*, III. q. 1545.
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*See also* INSPECTORS OF WEIGHTS AND MEASURES.

TRADE SOCIETIES. *See* BEARSTED. HEADCORN.

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YOUNG, ADAM. *See* COMMISSIONERS OF INLAND REVENUE.

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ZEALAND, NEW:
Verification of Imperial Standards for; IV. 21.

ZENTIGRAMM:
A weight in North German Confederation, = 0·01 gram; II. 111.

ZENTNER:
A weight in North German Confederation, its equivalents in Imperial and Metric measurements; II. 111 (and *note*).

ZETLAND:
Verification of copies of Imperial Standards for; IV. 19.
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County police employed as inspectors of weights, &c. in; their salaries, &c.; IV. 404.

ZINC:
Not so durable as brass for coating weights; *Fowler*, III. q. 869.
Zinc rust easily rubs off iron; *Roberts*, III. q. 2719.

ZOLL:
The zoll (or inch) of the North German Confederation corresponds nearly to the English inch; II. 110 (*note*).

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... Report of the Commissioners appointed to inquire into the condition of the Exchequer (now Board of Trade) Standards Standards Commission. Presented to both Houses of Parliament by Command of Her Majesty
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